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MYCENAEAN TAXATION

The Mycenaean system of taxation has been the focus of much research in the last 30 years, most of it devoted to the study of individual series. In 1982, however, P. de Fidio extended this work in a very important and more wide-ranging study.¹ She has proposed that the tax documents (Mc at Knossos and Ma at Pylos) show not only how tax assessments were calculated, but also that similar calculations and reductions govern both the *collection* of other goods (such as flax on the Pylos N- series) and the *distribution* of goods by the palace. De Fidio further suggests that the figures we see on the Pylos tablets are not those originally intended, but reflect systematic reductions of a larger assessment. These ideas deserve careful evaluation, for they have important implications for our view of Mycenaean fiscal procedures. In this paper I should like to review the evidence and the arguments on these two related questions: a) what and how widespread was the system of *calculation* used in the Ma series? and b) how plausible and how widespread is the system of *reductions* de Fidio outlines? The evidence of the relevant series and tablets may be taken in turn.

The PY Ma Series

The Pylos Ma tablets are of course the starting point for any study of Mycenaean taxation.² They record assessments of six different commodities, labelled A through F, in a fixed ratio of fiscal units first identified by Bennett,³ and usually cited as 7 : 7 : 2 : 3 : 1.5 : 150. The taxes are imposed on the nine chief economic

¹ P. de Fidio, "Fiscalità, redistribuzione, equivalenze: per una discussione sull'economia micenea," *SMEA* 23 (1982) 83-136.

² De Fidio (supra n. 1) 84-106 with bibliography.

³ E.L. Bennett, Jr., "The Undeciphered Minoan Script," *Yale Scientific Magazine* (1951) 36.

districts of the Hither Province, and the seven of the Further Province; actual payments, debts and exemptions are also noted. Two theories were proposed early, and later refined, of how the palace reached the assessment figures. Lejeune⁴ suggested a 'bottom-up' system under which palace officials based the tax on the number of taxable individuals ("fiscal population") in each town. Wyatt⁵ proposed instead a "top-down" theory, whereby the palace first fixed the amount of tax desired from the kingdom as a whole, then divided it equally between the provinces, which were further divided into two subgroups. Within each subgroup towns joined to form two fiscal groups,⁶ whose totals work together to make the subgroup figures equal. To take commodity D as an example: according to Wyatt, the whole kingdom should give 80 fiscal units of D—that is 240 D since the fiscal unit in the ratio is 3. Each province is thus taxed 40 units (120 D), each subgroup 20 units (60 D) and each fiscal group (tax-contributor) 10 units (30 D). Lejeune⁷ later adduced some evidence in favor of the "top-down" principle of this theory, and it is de Fidio's starting-point as well. It is important to stress that all levels of the hierarchy are necessary to this theory of how assessments were made. As I once tried to show: "We cannot remove the subgroup level and still have equal divisions, and we cannot remove the tax-contributor level and still account for the anomalous [province] totals of commodities A, B and C."⁸ Table 1 shows the assessments for each town and the division into kingdoms (I, II for the Hither and Further Provinces respectively), subgroups (a, b) and fiscal groups (1, 2). Tablet numbers are given in parentheses.

⁴ M. Lejeune, "La série Ma de Pylos," *REA* 58 (1956) 3-39 = *Mémoires de philologie mycénienne* I (Paris 1958) 65-91; refined by J.-P. Olivier, "Une loi fiscale mycénienne," *BCH* 98 (1974) 23-35.

⁵ W.F. Wyatt, Jr., "The Ma Tablets from Pylos," *AJA* 66 (1962) 21-41; refined by C.W. Shelmerdine, "The Pylos Ma Tablets Reconsidered," *AJA* 77 (1973) 261-75.

⁶ Wyatt used the term "tax-contributors" but de Fidio's "gruppi fiscali" ("fiscal groups") is preferable; it is less cumbersome and it reflects the validity of these groupings for other fiscal matters besides taxes. Similarly I prefer de Fidio's term "unità fiscali" ("fiscal units") to Wyatt's "taxation units."

⁷ M. Lejeune, "Sur la fiscalité mycénienne Ma," in *Chaumont Colloquium*, 147-50; see also S. Hiller and O. Panagl, *Die frühgriechischen Texte aus mykenischer Zeit* (Darmstadt 1976) 193-99, 208-212.

⁸ Shelmerdine (supra n. 5) 269.

	(7) A	(7) B	(2) C	(3) D	(1.5) E	(150) F
Ia1: Pi-*82 (225)	28	28[8	<12> ⁹	[6]	600
Metapa (90)	28	28	8	12	6	600
	56	56	16	24	12	1200
Ia2: Petono (120)	63	63	17	27	[1]4 ¹⁰	1350
Ib1: Pakijapi (221)	22	22	7	10	[5] ¹¹	[500]
Apu ₂ we (124)	23	23	7	10	5	500
Akerewa (222)	23	23	7	10	5	500
	68	68	21	30	15	1500
Ib2: Rouso (365)	17	[17] ¹²	5	8	4	blank
Karadoro (346)	18	18	4	[8]	[4]	[400] ¹³
Rijo (193)	17	17	5	7	4	362
	52	52	14	23	12	762

⁹ The figure on the tablet is 22, but this is likely to be scribal error since 12 fits the ratio; see Wyatt (supra n. 5) 25 n. 41.

¹⁰ The figure 14, restored in *PTT* I rather than the fractional 13.5, is confirmed by Bennett's new reading of this tablet (personal communication); I am most grateful to him for permission to mention it here. On Ma 120 the entries for C and D come in reverse order; this was first thought to be the case with E and F as well. It is now clear, however, that the right hand fragment, though part of this tablet, does not join it, and that two unit strokes of the predicted 14 for commodity E are preserved before the ideogram for commodity F. The two pieces are now separated, the right hand fragment being designated Ma 121, and the tablet as a whole now reads:

Ma 120 [+ 121

.1 pe-to-no *146 63 RI M 63 *152 27 KE M 17 [O M 1]4 ME 1350 o [.2 o-da-a₂ , ka-ke-we , o-u-di-do-si *146 2 RI M 2 *152[] O[] ME

Fragment 120 ends with 17 [in line 1 and *152[in line 2; the abbreviation *o* for *o<-pe-ro>* in line 1 of fragment 121 is the continuation of the final entry in line 2.

¹¹ For E and F the figures extant are 4[and 400[. It is clear from the breaks that 5 and 500 could be restored (though nothing higher), and these numbers do fit the ratio.

¹² The extant figure is 14[; the restoration is suggested in *PTT* I.

¹³ The extant figure for F is 200[; 400 fits the ratio. De Fidio (supra n. 1) 89 restores 450, noting that the actual payment (*apudosis*) in line 2 is 440[. However, the *apudosis* of M 6 plus an exemption of M 2 exceeds the assessment of commodity E for *Zamaewija* on Ma 393, and Ma 346 may likewise record an excess payment of commodity F.

Ia1: Rawarata ₂ (216)	70	70	20	30	20	1500[
IIa2: Esarewija (330)	42	42	12	18	8	900
Zamaewija (393)	28	28	8	12	5	600
	70	70	20	30	13	1500
IIb1: A[.]ta ₂ (397)	24	24	[7] ¹⁴	[10]	[5]	500
Samara (378)	24	24	7	10	5	500
Timitoakee (123)	24	24	7	10	5	500
	72	72	21	30	15	1500
IIb2: Eraterewe (333)	46	46	[13]	[20]	10	1000[
Aterewija (335)	23	23	[7] ¹⁵	10	[5]	[500]
	69	69	20	30	15	1500

Table 1: Ma Tablet Assessments

Since the assessment total is, as it should be, 40 fiscal units of each commodity for the Further Province, but only 34 units for the Hither Province, the latter figure seems to reflect a reduction of six units, but how was this calculated, and from what original total? The answer based on Wyatt's scheme is outlined, for commodity D, in Table 2. The figures show how the theoretical assessment minus the reduction equals the extant assessment for each province, subgroup and fiscal group ($x = 1$ fiscal unit = 3 D).

$$\text{Kingdom: } 240 - 16(6x-2) = 224 (74x+2)$$

I: $120 - 16(6x-2) = 104 (34x+2)$	II: $120 - 0 = 120 (40x)$
<u>Ia1:</u> $30 - 6(2x) = 24 (8x)$	<u>IIa1:</u> $30 - 0 = 30 (10x)$
<u>Ia2:</u> $30 - 3(1x) = 27 (9x)$	<u>IIa2:</u> $30 - 0 = 30 (10x)$
Ia: $60 - 9(3x) = 51 (17x)$	IIa: $60 - 0 = 60 (20x)$
<u>Ib1:</u> $30 - 0 = 30 (10x)$	<u>IIb1:</u> $30 - 0 = 30 (10x)$
<u>Ib2:</u> $30 - 7(3x-2) = 23 (7x+2)$	<u>IIb2:</u> $30 - 0 = 30 (10x)$
Ib: $60 - 7(3x-2) = 53 (17x+2)$	IIb: $60 - 0 = 60 (20x)$

Table 2: Theoretical and actual figures for commodity D (Wyatt)

There is no reduction for the Further Province, and so the extant figures on the right match the theoretical assessments on the left.

¹⁴ The extant figure is 2[; the restoration is suggested in *PTT I*.

¹⁵ The extant figure is 4[; the restoration is based on the analogy of towns in Ib1.

The 6 unit (6x) reduction for the Hither Province is divided equally between the subgroups; thus subgroup Ia has a theoretical assessment of 60 (20x), reduced by 9 to the extant figure of 51 (17x). The division between fiscal groups is not even, but the fiscal units are not broken up. The anomaly in fiscal group Ib2 means that the assessment for the kingdom as a whole is 224 D instead of the expected 222 D (74 fiscal units).

De Fidio in reexamining the Ma tablets rejects two of Wyatt's assumptions. First, she sees the basic ratio of fiscal units not as 7 : 7 : 2 : 3 : 1.5 : 150, but as half that: 3.5 : 3.5 : 1 : 1.5 : 0.75 : 75. Thus, while agreeing that the palace assigned a tax to the whole kingdom and then subdivided it, she views the original assessment as 200 fiscal units of each commodity instead of 100. Second, she rejects the notion of subgroups and fiscal groups. Her view of how the assessments were reduced to the extant figures on the tablets is laid out, again for commodity D, in Table 3. The original assessment for the kingdom as a whole was 200 fiscal units of D, that is 200×1.5 , or 300 D. This amount was reduced by 3x for each of the 9 districts in the Hither Province, 27x, and 2x for each of the 7 districts in the Further Province, 14x. This 41x reduction left a tax on the kingdom of 159x (200x-41x), or 238.5 D. In order to reach the extant figure of 224 D, she postulates a *second* reduction of 10x to 149x, or 223.5 D; this figure is then rounded up to 224.

theoretical reductions, stage 1:

$$\text{Kingdom: } 300 \text{ (200x)} - 61.5 \text{ (41x)} = 238.5 \text{ (159x)}$$

$$\text{I: } 150 - 40.5 \text{ (27x)} = 109.5 \text{ (73x)}$$

$$\text{II: } 150 - 21 \text{ (14x)} = 129 \text{ (86x)}$$

theoretical reductions, stage 2:

$$\text{Kingdom: } 238.5 \text{ (159x)} - 14.5 \text{ (10x-0.5)} = 224 \text{ (149x+0.5)}^{16}$$

$$\text{I: } 109.5 - 5.5 \text{ (4x-0.5)} = 104 \text{ (69x+0.5)} \quad \text{II: } 129 - 9 \text{ (6x)} = 120 \text{ (80x)}$$

Table 3: Theoretical and actual figures for commodity D (de Fidio)

There is no evidence for the regular reductions of stage one, and in fact de Fidio abandons the idea of equal reductions when she comes to account for the extant figures for each district. Her figures for

¹⁶ Rounding off from 149x to extant figures for other commodities: A/B -1.5; C 0; E -0.75; F +87.

the Hither Province are given in Table 4.¹⁷ Each district starts from a theoretical assessment of 10x except *pe-to-no*, whose assessment (but not its reduction) is doubled.

pi-*82	15 - 3 (2x)	= <12> (8x)
me-ta-pa	15 - 3 (2x)	= 12 (8x)
pe-to-no	30 - 3 (2x)	= 27 (18x)
	60 - 9 (6x)	= 51 (34x)
pa-ki-ja-ne	15 - 4.5 (3x)	= 10.5 - 0.5 = 10 (7x-0.5)
a-pu ₂ -we	15 - 4.5 (3x)	= 10.5 - 0.5 = 10 (7x-0.5)
a-ke-re-wa	15 - 4.5 (3x)	= 10.5 - 0.5 = 10 (7x-0.5)
	45 - 13.5 (9x)	= 31.5 - 1.5 = 30 (20x)
ro-u-so	15 - 7.5 (5x)	= 7.5 + 0.5 = 8 (5x+0.5)
ka-ra-do-ro	15 - 7.5 (5x)	= 7.5 + 0.5 = 8 (5x+0.5)
ri-jo	15 - 7.5 (5x)	= 7.5 - 0.5 = 7 (5x- 0.5)
	45 - 22.5 (15x)	= 22.5 + 0.5 = 23 (15x+0.5)

Table 4: Assessments and reductions of commodity D by town (de Fidio)

This scheme is much more complicated than Wyatt's, and there is a bigger jump from the theoretical figures to those extant on the tablets. The biggest problem is the difference between theory and practice in the stage one reduction of 3x for each town. While it is not innately unlikely that towns in the Hither Province should have their taxes reduced by different amounts, I doubt the palace would devise an abstract scheme so different from the realities of which it was clearly aware. One could explain the discrepancy as a response to economic hardship, but in that case one might expect it to apply more evenly. De Fidio suggests that some districts pay more to compensate for the deficiency of others, which she argues might be made up in other ways.¹⁸ But the fact remains that these reductions too are imposed by the administrators as part of a system of assessments, on de Fidio's own view, and their irregularity thus needs some justification. There are other inconsistencies as well. (1) The stage one reduction was postulated (Table 3) to be 27 fiscal units, 3 per town, but in fact it comes to 30

¹⁷ The first 3 towns are Wyatt's subgroup Ia, the next 3, his fiscal group Ib1, and the last 3, his Ib2. However, the grouping is not meant to follow Wyatt's, but simply to show the similar treatment that certain towns share; see de Fidio (*supra* n. 1) 104.

¹⁸ *Supra* n. 1, 104: such as extra work by bronzesmiths exempted from tax on the Ma tablets.

units (Table 4). This discrepancy is nowhere explained. (2) *Petono*'s theoretical assessment is doubled, but not its reduction. (3) The 10x reduction of stage 2 is said to be "suddivisa grosso modo in parti eguali fra le due province,"¹⁹ but in fact de Fidio's figures show the distribution is far from equal:

	A/B	C	D	E	F
HP:	16.5 (4.71x)	5 (5x)	5.5 (3.67x)	1.75 (0.23x)	213 (2.84x)
FP:	20 (5.71x)	5 (5x)	9 (6x)	6.5 (8.67x)	450 (6x)

Except for commodity C, the division is not only unequal, it is distributed differently for each commodity, and the total only approximates the predicted 10 fiscal units. This seems very unlikely given the consistency otherwise presumed and observed in the Ma series. (4) No proposal is offered to account for the Further Province town figures. If we attempt one, following de Fidio's method of dividing the 100x province assessment into 10 equal parts, two districts (*Rawarata*₂ and *Eraterewe* are those with appropriate figures) must have double assessments (20x = 30 D). In fact, *Rawarata*₂'s extant assessment is precisely this, with no sign of the stage 1 reduction of 2x presupposed for the Further Province; while *Esarewija*'s assessment, so far from being reduced from the 10x norm by 2x, is actually raised by that amount. Here, as for the Hither Province, the scheme which de Fidio suggests the palace followed does not lead in any systematic way to the numbers on the tablets. (5) The adjusted ratio 3.5 : 3.5 etc. requires many fractions, and consequently much rounding off of numbers to reach the extant figures. Some rounding off will be needed on any scheme, and in most cases the differences here are very small, but it is hard to imagine the palace adopting a system which required them so often to work in fractional fiscal units. For the two securely identified commodities A and D, we would have to imagine a fiscal unit of 3 1/2 textiles, and 1 1/2 oxhides! (6) Finally, this theory denies the subgroups and fiscal groups any meaningful role in the palace's calculations; how can one explain in that case why totals at these levels are, in fact, so often equal?

Despite these real difficulties in de Fidio's theory, it is worth considering further her suggestion that the Pylos administrators calculated taxes on the basis of her 200 fiscal units, or on Wyatt's

¹⁹ Supra n. 1, 98.

ratio 100, rather than 80 as Wyatt thought. Table 5 shows how systematic reductions from such an assessment would readily yield the extant figures for commodity D. From Wyatt's formulation I retain the 7 : 7 version of the ratio, and also the idea that subgroups and fiscal groups were fundamental to the palace's calculations.

$$\text{Kingdom: } 300 (100x) - 76 (25x+1) = 224 (75x-1)$$

I: 150 - 46 (15x+1) = 104 (35x-1)	II: 150 - 30 (10x) = 120 (40x)
Ia1: 36 - 12 (4x) = 24 (8x)	IIa1: 39 - 9 (3x) = 30 (10x)
Ia2: 39 - 12 (4x) = 27 (9x)	IIa2: 36 - 6 (2x) = 30 (10x)
Ia: 75 - 24 (8x) = 51 (17x)	IIa: 75 - 15 (5x) = 60 (20x)
Ib1: 39 - 9 (3x) = 30 (10x)	IIb1: 36 - 6 (2x) = 30 (10x)
Ib2: 36 - 13 (4x+1) = 23 (8x-1)	IIb2: 39 - 9 (3x) = 30 (10x)
Ib: 75 - 22 (7x+1) = 53 (18x-1)	IIb: 75 - 15 (5x) = 60 (20x)

Table 5: assessment and reductions for commodity D (Shelmerdine)²⁰

The extant kingdom assessment is nearly 75 fiscal units (225 D); this represents a reduction of 25x if the original assessment was really 100x. Each province is theoretically assessed 150 D (50x) to begin with, but the actual figure is, as we saw, lower for the Hither Province than for the Further Province. The difference between the hypothetical assessment and the actual extant figure for the Further Province is exactly 10x, evenly divided between the subgroups. This leaves a 5x reduction to be divided between fiscal groups. Given the observed policy of avoiding fractions,²¹ I suggest that the administration would not have split a fiscal unit at this point, and assessed each fiscal group 12.5x, or 37.5 D. The assessment instead of 39 and 36 D (13x and 12x), and reductions of 3x and 2x, do lead to the figures we see on the tablets. It is not possible to know for this commodity which fiscal group had the larger assessment and which the smaller. In the Hither Province the same principle will hold, except that the theoretical total is reduced by 15x rather than 10x. A reduction of 8 and 7 units respectively

²⁰ The assignment of the higher original assessment to IIb2 is arbitrary; IIa1 receives the higher assessment based on figures for Commodity E; see below n. 21.

²¹ Now clearly demonstrated by the improved reading of Ma 120 (supra n. 10): F 350 but E [1]4, not [13.5].

for the subgroups leads readily to the extant figures at both this and the fiscal group level. Though it is surprising perhaps that Ib2, with a lower assessment, has the larger reduction, this is what the tablets in question show.

This scheme differs from Wyatt's only in suggesting the possibility that the original kingdom assessment was 100x, not 80x of each commodity. The extant assessments show what the rest of the figures must have been, if that were the case, and they reflect a regular and systematic series of reductions. Table 6 shows how the same theory would operate for the other commodities.

Commodities A/B (x = 7):

$$\text{Kingdom: } 700 (100x) - 180 (25x+5) = 520 (75x-5)$$

I: 350 - 111 (16x-1) = 239 (34x+1)	II: 350 - 69 (10x-1) = 281 (40x+1)
Ia1: 84 - 28 (4x) = 56 (8x)	IIa1: 91 - 21 (3x) = 70 (10x)
Ia2: 91 - 28 (4x) = 63 (9x)	IIa2: 84 - 14 (2x) = 70 (10x)
Ia: 175 - 56 (8x) = 119 (17x)	IIa: 175 - 35 (5x) = 140 (20x)
Ib1: 91 - 23 (3x+2) = 68 (10x-2)	IIb1: 84 - 12 (2x-2) = 72 (10x+2)
Ib2: 84 - 32 (5x-3) = 52 (7x+3)	IIb2: 91 - 22 (3x+1) = 69 (10x-1)
Ib: 175 - 55 (8x-1) = 120 (17x+1)	IIb: 175 - 34 (5x-1) = 141 (20x+1)

Commodity C (x = 2):

$$\text{Kingdom: } 200 (100x) - 51 (25x+1) = 149 (75x-1)$$

I: 100 - 32 (16x) = 68 (34x)	II: 100 - 19 (10x-1) = 81 (40x+1)
Ia1: 24 - 8 (4x) = 16 (8x)	IIa1: 26 - 6 (3x) = 20 (10x)
Ia2: 26 - 9 (4x+1) = 17 (9x-1)	IIa2: 24 - 4 (2x) = 20 (10x)
Ia: 50 - 17 (8x+1) = 33 (17x-1)	IIa: 50 - 10 (5x) = 40 (20x)
Ib1: 26 - 5 (3x-1) = 21 (10x+1)	IIb1: 24 - 3 (2x-1) = 21 (10x+1)
Ib2: 24 - 10 (5x) = 14 (7x)	IIb2: 26 - 6 (3x) = 20 (10x)
Ib: 50 - 15 (8x-1) = 35 (17x+1)	IIb: 50 - 9 (5x-1) = 41 (20x+1)

Commodity E (x = 1.5):

$$\text{Kingdom: } 150 (100x) - 34 (23x-0.5) = 116 (77x+0.5)$$

I: 75 - 22 (15x-0.5) = 53 (35x+0.5)
Ia1: 18 - 6 (4x) = 12 (8x)
Ia2: 19.5 - 5.5 (4x-0.5) = 14 (9x+0.5)
Ia: 37.5 - 11.5 (8x-0.5) = 26 (17x+0.5)

$$\begin{array}{lll}
 \text{Ib1: } 19.5 - 4.5 (3x) & = & 15 (10x) \\
 \text{Ib2: } 18 - 6 (4x) & = & 12 (8x) \\
 \text{Ib: } 37.5 - 10.5 (7x) & = & 27 (18x)
 \end{array}$$

$$\text{II: } 75 - 15 (10x) = 60 (40x)$$

$$\begin{array}{lll}
 \text{IIa1: } 19.5 + 0.5 (0x+0.5) = 20(10x+5)^{22} \\
 \text{IIa2: } 18 - 5 (3x+0.5) = 13 (10x-2) \\
 \text{IIa: } 37.5 - 4.5 (3x) = 33 (20x+3)
 \end{array}$$

$$\begin{array}{lll}
 \text{IIb1: } 18 - 3 (2x) & = & 15 (10x) \\
 \text{IIb2: } 19.5 - 4.5 (3x) & = & 15 (10x) \\
 \text{IIb: } 37.5 - 7.5 (5x) & = & 30 (20x)
 \end{array}$$

Commodity F ($x = 150$):

$$\text{Kingdom: } 15000 (100x) - (4188) = (10812)$$

$$\text{I: } 7500 - (2688) = (4812)$$

$$\begin{array}{lll}
 \text{Ia1: } 1800 - 600 (4x) & = & 1200 (8x) \\
 \text{Ia2: } 1950 - 600 (4x) & = & 1350 (9x) \\
 \text{Ia: } 3750 - 1200 (8x) & = & 2550 (17x)
 \end{array}$$

$$\begin{array}{lll}
 \text{Ib1: } 1950 - 450 (3x) & = & 1500 (10x) \\
 \text{Ib2: } 1800 - (1038) & = & (762) \\
 \text{Ib: } 3750 - (1488) & = & (2262)
 \end{array}$$

$$\text{II: } 7500 - 1500 (10x) = 6000 (40x)$$

$$\begin{array}{lll}
 \text{IIa1: } 1950 - 450 (3x) & = & 1500 (10x) \\
 \text{IIa2: } 1800 - 300 (2x) & = & 1500 (10x) \\
 \text{IIa: } 3750 - 750 (5x) & = & 3000 (20x)
 \end{array}$$

$$\begin{array}{lll}
 \text{IIb1: } 1800 - 300 (2x) & = & 1500 (10x) \\
 \text{IIb2: } 1950 - 450 (3x) & = & 1500 (10x) \\
 \text{IIb: } 3750 - 750 (5x) & = & 3000 (20x)
 \end{array}$$

Table 6: assessments and reductions for commodities A-C, E-F (Shelmerdine)

²² It seems best to assume that IIa1 did not receive its reduction for some reason, and thus to assign the higher assessment to this fiscal group. Otherwise we should have to assume an original assessment of 18 E was raised rather than lowered, something which never happens otherwise in this series.

This scheme assumes that the central administration started from a kingdom-wide assessment of 100x; in other words, this total was 100% of what the palace wanted. It meets some of the concerns raised above about de Fidio's proposal, though it does not meet them all; for instance the Hither Province reduction for commodities A and B is closer to 16 than 15 units. Also, for none of the commodities is the kingdom reduction precisely the 25x postulated, though for C, D and E the difference is slight. Does the hypothesis, however, present any advantages over Wyatt's? 28 of the 40²³ fiscal group calculations work just as the theory predicts (29 if the 0.05 difference for Commodity E in Ia2 is taken as simple rounding off of a fraction). But on Wyatt's scheme 27 (or 28, assuming rounding off) of 40 calculations match the theoretical figures. Thus neither possibility is preferable on this basis; the only figure which the new theory explains better is that for E in fiscal group Ib2. Nor does either theory account better than the other for the anomalous figures. The new proposal does, however, present some advantages over both Wyatt's and de Fidio's: 1) it proposes as an original assessment a round 100x instead of 80x of each commodity, which might be thought a more likely theoretical starting point, just because it is simpler (100 units = 100%); 2) it postulates reductions for both provinces instead of just one and achieves them in a systematic way; 3) it divides reductions more consistently among fiscal groups, yet without splitting fiscal units;²⁴ 4) it explains quite simply the anomalous figure for Commodity E in IIa1 (*Rawarata*₂); 5) it explains the different figures for fiscal groups in the Hither Province better than Wyatt's theory, because it assumes somewhat different original assessments, based again on a reluctance to split the fiscal unit, but also perhaps on ability to contribute. Thus it might be decided in abstract that Ia's 25x assessment would be subdivided into 13x and 12x; but which fiscal group would be assessed 13x might depend on which was richer generally in the products assessed. For the more equal

²³ Of 39, if we omit commodity F for fiscal group Ib2, with its apparently incomplete entry for *Rouso*.

²⁴ On Wyatt's theory the reductions assumed are 2x and 1x for Ia1 and Ia2; 0x and 3x for Ib1 and Ib2; and of course 0x for the Further Province. There is no ready explanation for the differences. On the new theory different reductions for fiscal groups are as equal as possible without splitting fiscal units: thus 4x and 4x for Ia1 and Ia2; 3x and 4x for Ib1 and Ib2; 3x and 2x for IIa1 and IIa2; 2x and 3x for IIb1 and IIb2.

figures for fiscal groups in the Further Province, however, Wyatt's assumption that these were the original, equal assessments is more straightforward. That, in fact, may be thought the chief advantage of Wyatt's theory over this one: that it need not resort to hypothetical reductions to account for those Further Province figures which follow the basic ratio, but uses them as its starting point. This view is of course the reverse of point two above, that if reductions are applied it is reasonable to imagine that both provinces benefited from them.

The whole question deserves further discussion. Then too, the Ma tablets are only the starting-point for de Fidio's discussion of other tablets and series, to which we must now turn.

PY Cn 608, Vn 20

It has long been clear that the proportional relationship of districts seen in the Ma series also applies to other fiscal transactions.²⁵ On Cn 608, for example, pigs are distributed to towns in the Hither Province in the same proportions as their tax assessments on the Ma series:

Ia1:	pi-*82 me-ta-pa	3 3	Ib1:	pa-ki-ja-si a-pu ₂ -we a-ke-re-wa	2 2 2
Ia2:	pe-to-no	6	Ib2:	e-ra-te-i ka-ra-do-ro ri-jo	3 2 2

Totals for sub-groups and for fiscal groups are equal, as they should be, at 12 and 6 pigs respectively, with only one anomalous figure for *Eratei*, which substitutes here for the place name *Rouso*. De Fidio proposes to incorporate this tablet into her system of assessments and reductions discussed above for the Ma series, assuming a fiscal unit of 0.3 pig.²⁶ That is, she assumes an original intention to distribute 30 pigs (100x) to the province as a whole. The extant total is 25 pigs; this means a reduction not of 3x per district, as in the Ma series, but 2x (0.6 pig), or 5.4 pigs in all, and the resulting fraction is rounded up from 24.6. De Fidio notes that though the reduction is calculated on the basis of 9 districts it is

²⁵ Shelmerdine (supra n. 5) 275.

²⁶ De Fidio (supra n. 1) 106-107.

applied to only five. This is awkward, though conceivable; a more troublesome feature is the idea of basing calculations on fractions of a pig. This ignores practical realities; surely the administration would have dealt in terms of whole animals not only in making distributions but also in developing a basis from which to calculate them. For this reason it is equally unsatisfactory to apply to Cn 608 either Wyatt's system or the modified version of it outlined above; again the fiscal unit would be a fraction.

It is more straightforward to assume that one pig equals one fiscal unit, if one wishes to use the term here, and further that the figures on Cn 608 simply represent the full allotment originally intended. There is really no need to assume that reductions were involved at all, let alone that the Ma series provides the model by which they were calculated. This distribution may not be part of a regular (monthly? annual?) program; even if it is, reductions if any would likely be based on the availability of animals, rather than on the formula by which contributions to the palace were calculated. What is notable is the grouping of towns into subgroups and fiscal groups with equal totals. If this is a carryover from the Ma series, it is interesting to note that the total of 25x (25 pigs) is half the 50x provincial assessment on the Ma tablets. This figure is halved for the subgroups and halved again for the fiscal groups, and the concern for keeping fiscal units intact (at least until the pigs reach the butcher) explains the extra pig for Ib2. This suggests that the fiscal relationship among the towns can apply loosely to a variety of transactions, but these can be calculated from a starting point anywhere on the regular scale of 100/50/25/13 and 12 fiscal units. Not all must start from the 50x (or de Fidio's 100x) per province of the Ma tablets,²⁷ and not all are subject to a system of reductions used for tax purposes in the year of the extant tablets.

Vn 20 also refers to distributions to the Hither Province, this time of wine:

Ia1:	pi-*82-de	50	Ib1:	pa-ki-ja-na-de	35
	me-ta-pa-de	50		a-pu ₂ -de	35

²⁷ The alternative for Cn 608 would be that 50 pigs was the originally intended allocation, and that it was reduced for some reason by 50%. But this is not very likely; the amounts of the reductions would differ from that seen in the Ma series, and they would not be divided consistently among fiscal groups.

Ia2:	pe-to-no-de	100	Ib2:	e-ra-to-de	50
				ka-ra-do-ro-de	40
				ri-jo-de	20

Again the allotments to Ia1, Ia2 and Ib1 are equal (100 each), that to Ib2 slightly higher (110): De Fidio, as for Cn 608, assumes reductions of 2x per district from a total of 500 (taking the fiscal unit as 5), resulting in the extant province total of 410.²⁸ In this case she applies the reduction to each of the nine districts, not just to five of them. The districts are not reduced either by equal amounts, or by the amounts postulated for them in the Ma series. Wyatt's scheme would start with 10x ($x = 5$) per fiscal group, and this without reductions would account for Ia and Ib1 perfectly, but would not explain the high figure for Ib2. If for comparison we try to apply the proposed modification of Wyatt's scheme, we must assume either that some reduction has taken place or that the notional total was 400 instead of 410 (and the administration does not normally give more, or take less, than is called for). Otherwise 50x or 25x for the province would mean a fractional fiscal unit. An intended province total of $400 = 50x$ (just as in the Ma series) would give a fiscal unit of 8, but the allocation to fiscal groups would be 12.5x each instead of 13x and 12x, which seems to me unlikely. One could instead assume that $x = 10$, such that a province total of 50x reduces in whole units to the extant figures:

$$I: 500 (50x) - 90 (9x) = 410 (41x)$$

$$\begin{array}{rcl} Ia1: 120 & - 20 (2x) & = 100 (10x) \\ Ia2: 130 & - 30 (3x) & = 100 (10x) \\ Ia: 250 & - 50 (5x) & = 200 (20x) \end{array}$$

$$\begin{array}{rcl} Ib1: 130 & - 30 (3x) & = 100 (10x) \\ Ib2: 120 & - 10 (1x) & = 110 (11x) \\ Ib: 250 & - 40 (4x) & = 210 (21x) \end{array}$$

The higher than expected figure for Ib2 would in this case result from a reduction of 1x instead of 2x in the amount of wine distributed. The level of reductions would differ from that in the Ma series, just as under de Fidio's hypothesis. However, as for Cn 608 it is hard to see why one should think in terms of reductions

²⁸ De Fidio (supra n. 1) 106-107.

here at all. Again we should perhaps simply note the tendency of the central administration to distribute things equally to subgroups and fiscal groups, and not expect the same kind of reductions that may occur in a system of taxes.

The PY N- Series

The Na series records "forecasts" of amounts of flax to be contributed to the central administration,²⁹ and exemptions for various groups. The total assessment is the sum of the forecast and the exemptions recorded; the bookkeeping is thus different from the Ma series, where the assessments in line 1 include any exemptions recorded. In further contrast to the Ma series it is individual flax-growing communities who must contribute, not the entire fiscal districts. Despite these differences, de Fidio suggests that the same system of reduced assessments applies to this series as to the other texts discussed.³⁰ She assumes an original ideal assessment of 2x per village,³¹ and further that the forecast of 30 SA, the most common in the Na series, represents this 2x. On this hypothetical basis she calculates that each province was originally assessed 1500 SA, or 100x (as for the Ma series), and that a reduction of 2x per district was then made from this figure (as for Vn 20). The Hither Province totals on Ng 319 allow a comparison between this theoretical calculation and the actual figures:

theoretical assessment	SA 15 x 100	= SA 1500
reduction	SA 15 x 2 x 9	= <u>SA 270</u>
total		SA 1230

Ng 319.1 de-we-ro-a ₃ -ko-ra-i-ja	SA 1239
.2 to-sa-de , o-u-di-do-to	SA 457

The figure in line 1 is very close to that predicted after reduction by de Fidio. However, her theory only works if it is a

²⁹ The word is Chadwick's, *Docs.*², 469. The figures recorded after each place name are probably not actual contributions; Nn 228 records debts against 9 communities, several of which recur in the Na series, and the amount actually contributed would be the difference between the Na series projection and the deficit on Nn 228.

³⁰ De Fidio (supra n. 1) 107-111.

³¹ This figure she infers from Ma 393.3 (supra n. 1, 102), where the inhabitants of *ma-ra-ne-nu-we* are exempted 2x of each commodity. This is different from the 2x reduction per *district* postulated for Cn 608 and Vn 20.

total of Na series assessments, not forecasts. Otherwise the amount 'not given' in line 2 should be added to that in line 1, as in the Na series, to make a total assessment of 1696 SA—considerably higher than de Fidio's figure of 1500. She therefore argues that unlike the Na texts, the Ng records follow the type of bookkeeping seen in the Ma series, and that line 1 does represent an assessment total including exemptions. Hand 1 is responsible for the Ng and most of the Na tablets;³² De Fidio suggests that he followed one system for the Na series, but copied the Ng figures from a colleague who had used the other system. As further evidence that this scribe was copying a model even in the Na series (though apparently not the same model as that proposed for the Ng tablets, since the method of calculation is different!), she cites variations of format and spelling there (*ereutero/-ra, kitijesi/]tjesi*, etc.).

It is very difficult to believe that the Na and Ng series were drawn up according to different systems by the same scribe, especially since that scribe is Hand 1. This scribe has greater authority to compile, correct and calculate totals than any other at Pylos.³³ His tablet Fg 253 probably records a total for some or all of the Ab series by Hand 21, he compiles the En and Ep tablets from the work of Hand 41 in the Eo and Eb series respectively, and he also records landholding totals in the Ed series. On An 616 *lat. sin.* he actually tabulated the number 10 in vertical digit strokes before replacing them with a horizontal ten stroke. Thus Hand 1 does use the work of other scribes, but always as the compiler and totaller of information, whether first recorded by another or by himself. In the Na and Ng series it would be characteristic of him to do his own totalling; it would be entirely unlike what we know of him to record individual data himself and then borrow another scribe's differently calculated totals. In fact, though, there is more than just analogy with the Na series to suggest that Ng 319.1 and 332.1 represent total forecasts, rather than or total assessments or contributions. There has been little discussion of this point, but Lejeune once argued that the figures present and restorable on Ng 319.1 and Ng 332.1 are of the right order of magnitude to represent the total of the Na series forecasts.³⁴ This conclusion is

³² Na 337, 561, 841 and 1027 are by S337-Cii.

³³ See *Scribes Pylos*, 50-58.

³⁴ M. Lejeune, "Les documents pyliens des séries Na, Ng, Nn," in *Études Mycéniennes*, 145-46; so *Docs.* 2, 298, 300; Hiller-Panagi (supra n. 7) 200.

still valid, though new readings and ascriptions have changed the data somewhat.³⁵

Another serious difficulty with de Fidio's theory here is that the N- series flax assessments are quite different from the kind of tax imposed in the Ma series, so that one must question the assumption that the two were similarly administered. There is no reason why the provincial totals should have been equal in the first place; the two provinces probably produced different amounts of flax, and the focus is on the ability of individual communities to contribute. It is not on the overall districts, where differences in local production could be evened out. The Ng series shows that the administration did keep track of how much flax each province was contributing, but the figures in line 1 at least must have been quite different, since 899 is the largest figure that can be restored for the Further Province on Ng 332.³⁶ Even though both deal with assessments and exemptions, therefore, the premise that the Ma series should provide a model for the system at work in the N-series is doubtful, especially since the Ma and Na method of calculation is clearly not the same.

The PY Jn Series

The most common bronze allotment in the Jn series is M 12, and de Fidio takes this as 2 fiscal units (2x), a standard amount per village; thus M 600 would be a hypothetical pre-reduction provincial allotment. Ja 749, recording 'so much [bronze] in all, L 34 M 26' (= M 1046, as L 1 = M 30), would mark the post-reduction allotment for the entire kingdom.³⁷ De Fidio suggests that this reduction amounts to 2x (M 108) per district for the Hither Province to M 492, and 1x (M 42) per district for the Further Province to M 558. The resulting hypothetical total of M 1050 is four more than the extant figure on Ja 749. The discrepancy is accounted for by assuming that the figure for each province was rounded off to reach a number divisible by the number of districts:

Less likely is the view of L.R. Palmer, *Interpretation*, 307 (so also *Scribes Pylos*, 41), that they represent deliveries.

³⁵ A presentation of the revised figures has been submitted to *Kadmos*.

³⁶ Not 999, *pace* de Fidio (supra n. 1) 110; in that case there we would expect three, not two registers of circular hundred strokes. See M. Lejeune (supra n. 34) 145 n. 24.

³⁷ De Fidio (supra n. 1) 114.

$$\begin{array}{ll} \text{HP} & 492 - 6 = 486 \div 9 = 54 \\ \text{FP} & 558 + 2 = 560 \div 7 = 80 \end{array}$$

In the abstract these calculations are attractive, but they are not based on any rationale that would justify them, and they run counter to principles invoked in the discussion of other tablets. For example, the method of administration is assumed to be the same here as that proposed for the Ma series and elsewhere. Yet the difference between fact and theory in the the Hither Province figure for bronze is here explained by rounding off, in the Ma series by a second reduction; here the adjustment is made to reach a figure divisible by 9, the number of districts, while in the Ma series the Hither Province tax was divisible by ten instead (supra pp. 130-31), with a supposed double assessment for *Petono*.

De Fidio further suggests that bronze is distributed to each province on the model of the "ripartizione" attested in Jn 829, that is at the rate of a fixed amount per district:

The overall scheme for the series is proposed to be the following:

$$\begin{array}{ll} \text{HP} & 600 - 6 = 594 \div 9 = 66 - 12 = 54 \times 9 = 486 + 6 = 492 \\ \text{FP} & 600 + 2 = 602 \div 7 = 86 - 6 = 80 \times 7 = 560 - 2 = 558 \end{array}$$

One must ask why Jn 829, which records *requisition* of bronze from district officials, should provide the model for bronze *distribution* to smiths, especially since, as de Fidio herself notes, smiths are not located by district but by specific place of work. In four cases the place name is the name of the district;³⁸ in the rest it is not, suggesting that the palace administrators did not base their allotments on the districts. Nevertheless the amount proposed is M 66 (11x, based on a fiscal unit of M 6) per district for the Hither Province, for a total of M 594. That figure is explained as L 2 (= M 60) per district, plus another L 2 divided among the 9 districts with a remainder of M 6: M 60 x 9 = 540 + M 60 = 600 - 6 = 594. The arithmetic is accurate, but this does not prove the theory correct; any different set of figures could be manipulated in the same fashion, leaving a remainder unaccounted for. For support de Fidio points to Jn 431.7, where an allotment of M 54 to smiths at *Apekee* is precisely M 66 - M 12 (2x, the predicted reduction per district of the Hither Province). However, this is not all the bronze

³⁸ *Akerewa*, Jn 310, 693; *apu₂we*, Jn 693; *asijatija*, Jn 750; *rouso*, Jn 832; see de Fidio (supra n. 1) 112.

allotted to this place on Jn 431; a second entry records M 27 for Potnian smiths there. Indeed Jn 431.7 is the only instance which can be explained by de Fidio's theory; no other town receives an amount close to that predicted as normal. What is one to make of the M 12 + Potnian M 11 allotted to *Akerewa* on Jn 310, or the M 16 to *A[ke]rewa* and M 26 to *Apu2we* on Jn 693? Both places are the centers of Hither Province districts, yet neither shows allotments approaching de Fidio's predicted standard. Similarly she argues that M 108 on Jn 601 is M 132 (the hypothetical amount for two districts) - M 24 (4x, the predicted reduction for two districts), although only one place name is involved. Such disproportionate distributions are not likely to be derived from a scheme originally based on equal allotments. Finally, M 80 on Jn 658 is explained as the appropriate allotment per district of the Further Province, after a 1x reduction from M 86—but the place name on this tablet, *Enipatewe*, is more plausibly assigned to the Hither Province!³⁹ Thus both the details of this explanation, and the premise that the Jn series should operate in a way similar to the Ma series, have serious weaknesses. It is not enough that one figure can lead arithmetically to another; some attempt must be made to show why the central administration would have found such a scheme to be useful, and to account for the majority of numbers on the tablets.

The KN Mc Series and Nc 5100

The Mc series, like the Pylos Ma series, records assessments (or contributions?) of four commodities in fixed proportions, three measured by quantity and one by weight. The ideograms are all different from those in the Ma series. De Fidio includes the Mc tablets in her discussion because of Olivier's suggestion,⁴⁰ which she supports, that the ratio among commodities G, H, I and J is not 5 : 3 : 2 : 4 but 3.5 : 2 : 1.5 : 3, thus making it possible to view both the Ma and the Mc ratios as part of a single system. As she notes, the extant figures show more cases of full or near agreement with the latter ratio than with the former.⁴¹ The evidence thus favors

³⁹ A.P. Sainer, "An Index of the Place Names at Pylos," *SMEA* 17 (1976) 37. De Fidio is fully aware of this (supra n.1, 116 n. 73), but cites the figure on Jn 658 as appropriate for the Further Province. She does not attempt to show how such a figure might have been reached for a place in the Hither Province.

⁴⁰ Supra n. 4.

⁴¹ Supra n. 1, 116-21. She reports two cases of exact correspondence and 10 of "maggiore approssimazione" (not further defined) with the ratio 5 : 3 : 2 : 4,

Olivier's view, whether the ratio is expressed as above or doubled to 7 : 4 : 3 : 6. As for Pylos, I prefer the latter because it seems to me that administrators would avoid fractions as much as possible. The extant figures which fit this ratio exactly are all multiples of the doubled version as well as the single, except for H 10 on Mc 1508, 4456 and 5818. Here the explanation seems to be that the figures are either twice the (doubled) ratio (for example, I 6[, J 12 on Mc 1508) or a little higher (for example, G 16 on Mc 1508 and 4456). H 10 follows this pattern in being a little higher than the expected H 8. Beyond noting the probable correspondence it is not possible to go; there need be no similarity in function or value between, for example, commodities A and B at Pylos and G at Knossos just because all may be expressed as 7 (or 3.5) in the ratio. Nor do the Mc tablets record district taxes. Instead, the contributors are named individuals, sometimes more than one from the same town (*ku-ta-to, da-*22-to*). Thus we can say only that a perhaps similar ratio is being used at Knossos and Pylos for different purposes.

De Fidio further points to the totalling tablets 4457 and 5107 as evidence that assessments were fixed at Knossos on the same basis of 100x as at Pylos. The figures preserved on each tablet approximate 100 times her basic ratio 3.5 : 2 : 1.5 : 3; added together they of course recall the doubled version of this ratio favored by Wyatt and others. At Pylos, de Fidio postulated assessments of 100x for each province, 200x for the kingdom as a whole, and here too adding the figures for each commodity on Mc 4457 and 5107 produces 200x, in her terms. But there is no indication that the area controlled by Knossos was divided in two for administrative purposes; indeed several geographical sectors are recognized.⁴² We do not know if Mc 4457 and 5107, added together, represent the total assessment for the Knossos kingdom; if

versus nine exact and 18 approximate for the ratio 3.5 : 2 : 1.5 : 3. Adding the newly joined Mc 5818 + 5820 + 8447 + frr., and the available figures from the fragmentary Mc 4464, 5118, 5809 and 8448, I reach the following totals: four cases of exact correspondence to the former ratio, and 28 cases within 0.2 of the expected figure; 9 cases exact and 37 within 0.2 for the latter ratio. I am grateful to J.-P. Olivier for information about the joins to Mc 5818.

⁴² See for example J.K. McArthur, *A Tentative Lexicon of Mycenaean Place-Names. Part One: The Knossos Tablets = Minos 19* (1985) Appendix 1-136; J.L. Bennet, "The Structure of the Linear B Administration at Knossos," *AJA* 89 (1985) 231-49; both with references.

so, they do represent 100x in the ratio expressed as 7 : 4 : 3 : 6.⁴³ It is thus possible that we have in the Nc series a proportional system of assessments similar to that at Pylos and similarly using 100x as a starting point.

As Killen has shown, KN Nc 5100 provides another parallel to the Ma series,⁴⁴ and thus a further indication that taxation procedures at the two sites were similar. Nc 5100 records at least three of the commodities that appear on the Pylos tax records (*146, RI, and KE, that is commodities A, B and C); Nc 8175 is almost certainly part of the same tablet:⁴⁵

Nc 8175	e-si-[lat. inf. o-pe[-ro]	Nc 5100 + 8184] M 'ri' 8 o M 4 lat. inf.]2 KE M 10 *146 6
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The second entry on the recto could also be read *O M 4*, a fourth commodity (E) of the Ma series. The choice of reading depends partly on one's view of the relation between this tablet and the rest of the Nc series. Most of those tablets record masculine personal names and small weights of a commodity which is usually left unnamed, but which is twice noted as *SA*. On the Pylos Na tablets this ideogram represents flax, and is counted; Killen had suggested that the Nc series concerned linen, which is weighed and which can be indicated by the same ideogram.⁴⁶ Nc 4484 [+] 4488, though, is a totalling tablet recording a much larger *a-pu-do-so[-mo]* from a town convincingly restored as Amnisos (*a-]mi-ni-so*). The word *apudosmos* defines a tax-like contribution from town to palace, and its association with Nc 5100 strengthens the parallel with the Ma series.⁴⁷ This could mean the rest of the Nc tablets also record such contributions; or the others could be interpreted as distributions to

⁴³ One could be an amended version of the other, or there could have been more such tablets which have not survived.

⁴⁴ J.T. Killen, "The Textile Industries at Pylos and Knossos," in *Pylos Comes Alive*, 62-63; idem, "New Readings in the Linear B Tablets from Knossos," *Kadmos* 24 (1985) 29-30; idem, "Epigraphy and Interpretation in the Knossos WOMAN and CLOTH Records," in *Studies Bennett*, 180-81. See also J.-P. Olivier, "107 raccords et quasi-raccords de fragments dans *CoMIK I et II*," *BCH* 112 (1988) 81-82.

⁴⁵ "Sans doute," Olivier (supra n. 44) 81 (where Nc 8715 is a misprint for 8175).

⁴⁶ J.T. Killen, "The Knossos Nc Tablets," in *Cambridge Colloquium*, 36-37.

⁴⁷ See Olivier (supra n. 44) with references.

the individuals named, while Nc 5100 and Nc 4484 together belong to a different type.⁴⁸ This seems likely; a different ideogram for linen, notation of deficits and other ideograms on the lower edge, and a larger quantity of linen set Nc 5100 apart from the rest of the series. If Nc 4484 is linked with it, Nc 5100 too should note actual payments rather than assessments, and the recto thus makes sense as the record of a payment and a deficit. No other Nc tablet records a deficit, but if Nc 5100 is of a different type that is not a concern. However, one could argue that since the lower edge records only deficits, the recto might be reserved for payments; this would favor the reading *O M 4*. As Killen points out, the presence of a second ideogram would explain the addition of 'ri' to the first entry. Because two or three of the numbers on Nc 5100 are deficits, one cannot say whether assessments or payments would show a fixed ratio, or what that ratio would be, though again the parallel with the Ma series is suggestive. Thus, while the Mc series shows traces of a similar *system* of assessments at Knossos and Pylos, Nc 5100 suggests that the same *commodities* may have figured in the scheme of *apudosis* contributions.

Conclusion

We may return, then, to the questions posed at the beginning of this article. What and how widespread was the system of assessments and reductions used in the Ma series? A review of the evidence suggests that de Fidio may be right in suggesting that the palace started from 100x rather than 80x in assessing taxes. It seems likely, however, that this 100x applied to the entire kingdom rather than to each province, and that the ratio of proportions between commodities should continue to be expressed as 7 : 7 : 2 : 3 : 1.5 : 150. De Fidio's demonstration of how reductions were achieved, based on originally equal assessments for each district, has a number of troublesome inconsistencies. However, retaining the 7 : 7 : 2 : 3 : 1.5 : 150 version of the ratio as well as Wyatt's theory of subgroups and fiscal groups, one can see a consistent and systematic relationship between the original assessment thus assumed and the actual figures on the Ma tablets. The arithmetic is simple, and reluctance to split the fiscal unit of a commodity actually accounts for inequalities between fiscal group figures

⁴⁸ See Killen, "New Readings" (supra n. 44), noting the analogy that both collections and distributions are recorded by the same scribe in the Fh series.

which have hitherto been puzzling. When we look at other Pylos tablets, however, the scheme of calculations proposed does not seem to be as widely applicable as de Fidio argues. The case for reductions cannot be regarded as proven, or even probable, for any of the other texts discussed: Cn 608, Vn 20, the N- series, or the Jn series.⁴⁹ The economic districts could stand in the same proportional relationship to each other when receiving goods as when contributing them; this is clear from Cn 608 and Vn 20. However, the Ma series method of calculation cannot be shown to work here. Nor can the same procedures be shown to exist in the N- and Jn series. An important issue is at stake here: it is necessary to consider not only the numbers on the tablets, but the kinds of fiscal operations involved. Though the palace administration surely demanded certain quantities of flax, for example, from each province, the amount in each case is most likely to depend on production capacities of individual growing centers, not on the relationship among economic districts by which taxes were assessed. This is borne out by the concentration on specific place-names in the Na series, and by the difference in bookkeeping methods from that used in the Ma tablets. The same is true for the Jn series, which again deal not with economic districts but with smiths in a variety of towns. Neither an original equality of distributions, nor a procedure like that of the tax documents, has been convincingly demonstrated. Where one can agree with de Fidio to see echoes of the Ma (*apudosis*) system is precisely where one should expect to find them: in the Mc series and Nc 5100, which likewise deal with tax assessments. That these documents come from Knossos is extremely interesting. One possible reason for the similarity is that Knossos provided a model which Pylos, and conceivably other mainland centers, adopted and modified.

⁴⁹ I have left out of this discussion the Ac series, where figures for the districts of the hither province have been thought to stand in the same proportional relationship as those in the Ma series. See M.L. Lang, "The Palace of Nestor Excavations of 1957: Part II," *AJA* 62 (1958) 190; C.W. Shelmerdine, "Industrial Activity at Pylos," in *Tractata Mycenaea*, 339-40. A new reading, based on a fresh look at these tablets by Emmett Bennett (whom I thank once again for permission to mention it), changes this picture. The figure for *pe-ni-ni-jo* men on Ac 1275 is clearly 25, not 69; this is not roughly twice the figures for men from *me-ta-pa* and *pi-*82* which the Ma tablets would lead one to expect. Thus we can no longer think of the Ma proportions as applying to the Ac series, though the men may still be requisitioned under essentially the same *apudosis* system. See also Stavrianopoulou in this volume.

This possibility does not depend on an earlier date for the Knossos tablets, but on the proposition that the system in question was first applied there. It is of course equally possible that a mainland center developed the scheme, which was then taken to Crete. In any case, it is not easy to dismiss the two kinds of parallels (an *apudosis* system, based on a similar proportional scheme, and also some interest in the same commodities) as coincidence. It seems more plausible to suggest that in the realm of fiscal procedures, as in so much else, there was a good deal of communication and interaction between Greece and Crete in the Late Bronze Age.