

The Roman Emperors' Army Costs

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The Roman Emperors' Army Costs

In 1939 Tenney Frank wrote finis to his grand project, an *Economic Survey of Ancient Rome*. At the forefront of the final, fifth volume he offered careful approximations of what money the government had to spend each year, and its fixed costs. To my knowledge, no improvement has been attempted on these results of his, and something now seems possible in the light of recent researches, concerning at least the major item of that cost : the army. Knowing better how much the army cost, we can go on to measure its effects on governmental policy and on the unhappy taxpayer, too – especially in times of war emergency. Several very substantial developments in the course of the empire's history seem to have been brought about, or at least to have been given their particular direction, by the military budget.

In that budget there were two elements : rate of pay and numbers of men. We still have only two firmly based figures bearing on the first element, namely, Base Pay for legionaries from Augustus to Domitian (225 denarii), thereafter 300 d. (until the third century) ; yet scholarly consensus has bit by bit surrounded these figures with a network of others not so trustworthy but apparently usable. They underlie the Appendix.

As to numbers of men, the wild range of conjecture discoverable among even the best scholars ⁽¹⁾ can be a good deal disciplined, thanks especially to the gradual accumulation of more exact and complete data on auxilia (data on other units seem to have been known but somehow ignored). The second-century total, prior to Septimius Severus' adding of three legions and trebling of the troops in the capital, should theoretically lie at about 415,000 (11,500 in Rome, plus 158,400 legionaries, plus Holder's 447 quingenary units and 36 milliary, but excluding a few numeri). We happen to detect, however, a 500-man auxiliary unit 43 men under strength in this period, and other signs of the same condition seem fairly

(1) See R. MACMULLEN, in *Klio*, 62 (1980), p. 451 ff. But my own figures are wrong, too : the maximum of 34 legions under Septimius Severus (p. 452, following A. H. M. JONES, *The Later Roman Empire*, Norman, 1964, p. 59), should be 33 ; and, in the light of P. A. HOLDER, *Studies in the Auxilia of the Roman Army*, Oxford, 1980, p. 217-240, both Tacitus' and E. Birley's totals for auxiliaries (MACMULLEN, p. 452 and n. 2) must be sharply revised upward, to 483 units in existence at one time, between Vespasian and Trajan (supposing that Holder's 41 "inferred" units, p. *cit.*, did really exist).

common over-all ⁽²⁾. Accordingly, a total of 375,000 is likely to be closer to the truth ⁽³⁾.

At its paper-strength the army of the Antonines would have cost just over a hundred million denarii a year (with Base Pay = 300 d., times the total of 360,000 BPs drawn from the Appendix); actually less, however, because of units under strength. Let us make up that difference by counting in the navy, so as to bring our list of expenses into line with Tenney Frank's. He supposed (p. 53) that the state's income under Vespasian was at least three times that total, with an upper limit of 375 million d. He indicates ups and downs thereafter but no significant, over-arching change prior to the reign of Septimius Severus. Thus, from having drawn off a full half of the state's income under Augustus ⁽⁴⁾, the sum of military costs was now in the second century drawing off a third or less. Antonine prosperity could hardly appear more convincingly than in that comparison. That, even so, the empire could not easily afford great military efforts, and that its size and fortunes were still very closely constrained by considerations of expense, will become clearer later on (p. 577).

Dio reports that Caracalla's pay increase to the troops (evidently of all categories: 78.63.2, *οἱ στρατιῶται ...*, 3, *σφισι διδοσθαι*) added 70 millions to the payroll. He does not specify the coin but he must mean denarii ⁽⁵⁾. Using our (rounded) figure of 360,000 BPs in the Appendix and setting Base Pay under Septimius Severus at the figure most recently conjectured, 400 d., the cost of the army (excluding the navy, now) comes to 144 millions: so an increase to BP = 600 d., also a figure recently suggested as the amount of Caracalla's raise, confirms Dio almost exactly ⁽⁶⁾. The confirmation is reassuring – indeed it seems absolutely astonishing.

(2) J. D. THOMAS and R. W. DAVIES, in *JRS*, 67 (1977), p. 57, cf. other evidence in MACMULLEN (1980), p. 453 ff.

(3) My figures generally agree with A. R. Birley's, in *The Roman West in the Third Century*, ed. A. KING and M. HENIG, Oxford, 1981, p. 41; but he does not explain in detail how he reckons his totals, and he does not take account of under-strength units. He suggests (p. 46) "400,000 or more".

(4) T. FRANK, *op. cit.*, p. 53, suggests about 125 million d. of income for the middle of Augustus' reign, at a time when (setting aside the mistaken figures on p. 4 ff.) the troops must have cost not much less than 300,000 BPs (= Base Pay amounts), i.e. 67,500,000 d.

(5) As at 61.10.3, for example, or 68.2, 77.11.1, or 77.24.1, cf. the interpretations of FRANK, *op. cit.*, p. 62 and 76 or of R. DUNCAN-JONES, *The Economy of the Roman Empire*, Cambridge, 1974, p. 17 and 40. When Dio does specify a coin, it is the drachma = denarius, as at 51.17.7, 67.3.5, 72.16.2, or 74.8.4. For handling of Dio 78.36.2, cf. R. DEVELIN, in *Latomus*, 30 (1971), p. 688, giving access to earlier scholarship but concluding "Dio's account ... patently is not" exact; better, P. A. BRUNT, in *PBSR*, 18 (1950), p. 59, n. 62, and A. R. BIRLEY, *op. cit.*, p. 43, finding the figure plausible but estimating only the legionary part (at 99-110 million d., where my own estimate would be ca. 85 million d.).

(6) Formerly BP = 500 (Septimius Severus) and 750 (Caracalla) were the most frequent

But alas, its exactitude is compounded of good guesses and mere coincidence. We have not taken into account Septimius Severus' three more legions than were used for calculation in the Appendix (33, note 30), nor the savings from under-strength units – these two omissions perhaps being in balance? And we have not taken into account new auxiliary units raised after Trajan – Holder notes a dozen such, casually, and Cheesman, another dozen or more⁽⁷⁾ – nor have we counted those lost over the period Trajan-Septimius Severus⁽⁸⁾. Though loss and gain through this pair of factors also may be roughly equal, our network of sources has certainly let a great deal of fact slip through. We must therefore accept Dio's figure as only an approximation like our own estimates, however happily the two fit together.

A. H. M. Jones had interpreted two Beattie papyri as showing BP = 600 d. still under Diocletian, and soldiers in *alae* likewise paid at their Caracalla level, that is, at two-thirds BP⁽⁹⁾; but in a very acute and careful reading of the texts, R. Duncan-Jones was able to see a rate rather of BP = 1800 d. with 600 d. in addition for *annona* and many thousands on top of that, through more or less regular *donatives*. Given the well known inflation that came to prevail in the last third of the third century, as Duncan-Jones points out, a Base Pay unchanged since early in that century would be inconceivable.

He also considers the size of units, hoping to arrive at grand totals for the army. He employs as one approach a method more elaborately applied by H. von Petrikovits, through measuring areas of the camps and forts of typical units, legions or cohorts or *alae*. This, however, varies greatly. We naturally look first at legionary camps and, within these, at the barracks-blocks and their subdivisions for officers and men. The two sites best preserved (Inchtuthill and Neuss) have almost exactly the same number of blocks containing, however, 14 rooms (excluding centurions' accommodations) in the one case, only 11 rooms in the other. There lies a difference of more than 25 percent. It is generally assumed that each room held 8 *contubernales*. At Inchtuthill, that makes a quite unacceptably large legion of 7368 men, not counting officers. At Lauriacum there appear to have been no officers' quarters at all; at Vindonissa, only 10 rooms per block; at Dangstetten, 11 or 12; at Haltern, 14 to 16. We have maniple-barracks five in

suggestions, cf. BRUNT, *art. cit.*, p. 58 ff.; for BP = 400 and 600, cf. DEVELIN, *art. cit.*, p. 692 and R. DUNCAN-JONES, in *Chiron*, 8 (1978), p. 549; but G. R. WATSON; *The Roman Soldier*, Bristol, 1969, p. 91, preferred BP = 450 and 675.

(7) HOLDER, *op. cit.*, p. 195 and 215; G. L. CHEESMAN, *The Auxilia of the Roman Imperial Army*, Oxford, 1914, p. 148-185 *passim*, units named Aelia, Aurelia, Septimia. I have attempted no thorough search.

(8) In HOLDER, *op. cit.*, p. 217-240 can be found 23 units (not all quingenary) that disappeared from the record after Trajan.

(9) *Op. cit.* (above, n. 1), p. 623 and n. 31; accepted by A. R. BIRLEY, *op. cit.*, p. 43 and by other scholars but rejected by DUNCAN-JONES, *art. cit.*, p. 544.

number for the First Cohort (Inchtuthill) or more often three, and officers' rooms large or small ⁽¹⁰⁾.

The archeological confusion thus needs to be interpreted by the literary sources ; but they are themselves in dispute and of dubious value (the *Historia Augusta* or Isidore), or late (like these two, or Suidas, Servius, Vegetius, or Lydus), or referring to unknown periods or a mixture of periods ⁽¹¹⁾. And we have still to take account of camps meant for legionaries but of perhaps more than one legion (but less than two) or less than an entire legion due to the regular absence of contingents elsewhere. From the Third at Lambaesis, more than 15 percent were drawn off to other postings at a given moment we know of ; at Caerleon for long periods a large part of the lodging-space was unused ⁽¹²⁾ ; and all our day-reports on papyri suggest a very fluid handling and posting-away of troops of all sorts in all centuries.

When we turn to auxiliary camps, we find those too varying greatly : for example, 2.5 acres (about 1 hectare) for a unit of 1.000 men (Housesteads) up to 4.5 acres (1.82 hectares) for the same number plus horses (Birrens) ⁽¹³⁾. These extremes raise great difficulties in the way of any conclusions about unit-size, therefore about total army-size and cost ; and they get worse, later, as Duncan-Jones would like to show : a camp for an ala contains a mere .17 hectare, on up to .76 ; or, for a cohort, .25 hectare, up to .81 ⁽¹⁴⁾. His calculations unfortunately cannot be accepted since he compares exterior circuits (including all the outworks)

(10) H. VON PETRIKOVITS, *Die Innenbauten römischer Legionslager während der Prinzipatszeit*, Opladen, 1975, p. 134 (Lauriacum), 36 (Vindonissa), 42 (Inchtuthill), 119 (Dangstetten and Haltern), and complicated interpretations of coh. I barracks, p. 42 ff., 119, and 121.

(11) *Ibid.*, 124 referring for the sources to the collection in J. MARQUARDT, *Römische Staatsverwaltung*², 2, Leipzig, 1884, p. 455, n. 6, where Hyginus 1.2 gives a total of 5280, SHA *Seu. Alex.* 50.5 gives 5000, and later sources give larger totals. Petrikovits prefers these latter (his Dio 72.12.5 does not show what he supposes). For modern views, see MACMULLEN, *art. cit.*, p. 452, n. 3.

(12) E. BIRLEY, in *Carnuntum Jb.*, 1963-64, p. 27, or *ibid.*, 32, vexillations from Britain spend some years in Germany ; and G. C. BOON, *Isca*, Cardiff, 1972, p. 46. Note, as an example of legionary detachments used for long-term garrison-duty, S. FRERE, *Britannia*, Cambridge, 1967, p. 154, at Benwell under Pius, or ARICESCU, *The Army in the Dobrudja*, Oxford, 1980, p. 11, on the dispersal of leg. V Macedonica.

(13) G. WEBSTER, *The Roman Imperial Army*, London, 1969, p. 206-213, on seven camps. Notice the largest of them, Caerhun (4.86 acres) for only a quingenary unit. Valkenburg (for about 860 men ?) contained ca. 2.85 acres, cf. for a supposed 500 men (though on campaign), a camp of less than half an acre, in I. A. RICHMOND, in *JRS*, 52 (1962), p. 152, Camp A, compared with the six acres for a coh. quingenaria at Künzing, in H. SCHÖNBERGER, in *JRS*, 59 (1969), p. 163. The British average for quingenary cohort-camps is 1.42 hectares, see S. FRERE in DUNCAN-JONES, *art. cit.*, p. 554.

(14) *Ibid.*, 555, and a little more evidence of the same sort in MACMULLEN, *art. cit.*, p. 459, n. 34.

of earlier camps with the interior circuits of the later ones, and moreover turns acres into hectares erroneously ⁽¹⁵⁾. Nevertheless, the *direction* of his argument, allowance being made for error in measurements, is surely right : fourth-century army units were much smaller.

It can be confirmed widely and easily. Besides the literary evidence ⁽¹⁶⁾, the archeological from the frontiers generally presents a picture of far more fragmented defense forces than prevailed in the Principate. Occasionally one can see basic strength-units reduced in size ⁽¹⁷⁾, and it is entirely common to see that new or re-built forts have become smaller. The best illustration is afforded by the activity under Valentinian along the upper Rhine eastward into Pannonia. The great majority of the scores and scores of forts resulting from this great burst of building measure a mere 80 to 150 square meters ⁽¹⁸⁾. The plan of many of them shows that their builders were aiming at uniformity, that is, were following some model approved by the higher government (very much like the wall-and-tower outline resulting from a similar burst of activity under Diocletian). It was intentional and authorized that soldiers should be distributed in smaller groups than had been common during the Principate. Why ?

In the earlier period we can easily see what was happening to military costs within the over-all budget : they were held stable, and therefore in relative terms, as government income rose, they sharply diminished from some 50 percent of the imperial budget to 33 percent or less. After the mid-third century, conclusions are more difficult to draw. Nevertheless, in the scattering-about of soldiers in smaller clusters, to say nothing of their emplacement inside some city, there lay a substantial saving in cost ; for their distribution thereby conformed better with existing natural patterns of production and distribution. It seems reasonable to

(15) FRERE, *op. cit.*, p. 223 supplies the basis of Duncan-Jones' calculations but counts rampart, intervallum, and everything else, whereas the eastern forts used by Duncan-Jones for comparison have no such features. For instance, Frere gives Fendoch 4.52 acres, but the camp interior measures roughly 3.66 acres (a difference of nearly one quarter). He gives as normal for a quingenary ala 5.5 acres (exterior, i.e. 2.22 hectares), which Duncan-Jones, p. 555, Table III renders as 2.63 hectares, invalidating the table. The area of Rutupiae he cites as 2.6 hectares, but here there is some slip in the reference (n. 55) which I cannot correct.

(16) MACMULLEN, *art. cit.*, p. 456-458, adding evidence to the same effect (i.e. legions of 1,000, auxilia of 500) from OROS., 7.36.6 and CLAUDIAN, *Bell. Gild.*, 418-423, in G. CLEMENTE, *La 'Notitia Dignitatum'*, Cagliari, 1968, p. 148-150.

(17) I can cite only J. J. WILKES, in *Britain and Rome. Essays ... E. Birley*, Kendal, 1965, p. 130, on the apparent reduction of contubernia from 10 to 6, implying a centuria-reduction from 80 to 50 men.

(18) J. GARBSCH, in *Bayerische Vorgeschichtsblätter*, 32 (1967), p. 76-78. The actual minima lie at about .0016 hectares up to .015. Compare the norms for the Principate in Britain, 1.42 hectares for quingenary cohorts and 1.83 for milliary, in FRERE, *op. cit.*, p. 223.

find in these savings both purpose and explanation for later Roman troop dispositions.

Let us examine this explanation in more detail. It is clear that troops on the move could carry food for themselves and for some small cavalry contingent for a period of only a few days, before requiring a baggage train that would itself need its own supplies ⁽¹⁹⁾. In those same few days, they would have passed beyond the reach of economical transport of supplies from their original base ⁽²⁰⁾. Grain and fodder intended for them and paid in to storage as taxes, but never called for by them, could not be sold back to the taxpayer or otherwise disposed of profitably. Accordingly, troops on the move must have constituted a surplus charge on someone, somewhere – let us say, a charge of an additional one third, if we estimate the consumption for each man at one modius of wheat per week at 3HS, plus other food-items and some further allowance to cover a proportion of cavalry, together making up a further 2,5 or 3HS : an average total of perhaps 75 d. per man per year. To this must be added considerably more in consequence of disturbances to the local market ; for the sudden appearance of a mass of consumers on the local scene would cause equally sudden rises in food prices. Testimonies to such rises are many. The opening of Diocletian's Price Edict is one of the most striking. But many, too, are the testimonies to the agony of his subjects when the emperor obliged them to play host to his army on its way to or from some front. By exception, when Theodosius was campaigning against Firmus (Amm. 29.5.10), "among many other outstanding actions, this made him immensely more popular, that he forbade his troops' rations to be supplied by the provincials". An idealized emperor, as the author of the *Historia Augusta* conceives him (Trig. tyr., 18.6), will similarly station cavalry and infantry close to the points of production of their supplies ; and, representing conventional good sense of the same period, a law of 386 (*Cod. Theod.*, 11.1.22) rationalizes the tax system involving inland and maritime cities ; for, when they were to some extent paying each others' quotas, *the transport costs exceeded the value or burden of the taxes themselves*.

Besides the value represented by the supplies that an army would need, we must consider how much it would cost to collect and deliver these same supplies. That figure, though varying greatly, is not beyond some rough calculation within representative situations ⁽²¹⁾. We may conclude that any significant group of

(19) D. W. ENGELS, *Alexander the Great* ..., Berkeley, 1978, p. 20 and 144 ff. – the picture varying as one imagines a larger or smaller train (with siege equipment or personal possessions or non-combatants).

(20) A. H. M. JONES, *The Roman Economy*, Oxford, 1974, p. 37 and 182.

(21) ENGELS, *op. cit.*, p. 126 shows the need of 10 lbs grain per horse per day and (p. 145) 3 lbs per man, to which something must be added for oil, meat, and wine ; therefore 10 lbs × 240 horses = 2400 lbs per day, and 3.5 lbs × 5280 men = 18480 lbs per day, total per legion 20880 lbs. Jones (1974), p. 37 shows that land-transport per mile per 1200

soldiers serving more than a day's march away from their base would have to be paid for by the area they passed through, or settled in, at the rate of a third as much per man as that man's Base Pay per day, on top of the extra third represented by the value of the food itself. Transport costs for other equipment and personal effects, especially officers', would be additional. At least in theory, all these expenses fell on the emperor, but practice was harsher: confiscations and surtaxes. Contemporaries quite correctly saw an army in action in the empire as costing a tremendous amount more than the same aggregate of men at rest⁽²²⁾. Hence (in large part) the third-century money crisis.

Per contra, there would be tremendous savings through distributing men in small, stationary groups at natural market-centers: in riverine forts, in towns, and at cross-roads. Since actual troop dispositions in the Later Empire correspond so well with this picture of economy, it seems fair to suppose that they were dictated by considerations of cost-saving. Imperial forces settled in clusters larger than a single legion, from time to time rearranged into vast armies of campaign, such as had been seen in the first and second centuries, were beyond Rome's means in the fourth and fifth.

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lbs cost $\frac{1}{3}$ the current price of 60 modii (1200 lbs) of wheat. DUNCAN-JONES, *The Economy of the Roman Empire*, Cambridge, 1974, p. 146, shows wheat at average price of 3HS per modius in the early Principate. (We may for caution's sake put aside H. M. D. PARKER, *The Roman Legions*, Oxford, 1928, p. 220, who suggests slightly higher figures: 60 modii of grain consumed per man per year, at 1 d. per modius). Transportation costs would then be at least $\frac{1}{3} \times 60 \text{ modii} \times 3\text{HS} = 36\text{HS} = 9 \text{ d. per mile per } 1200 \text{ lbs.}$ — which sounds reasonable for a waggon, pair of oxen, and drover. Suppose one third of a legion's needs must be fetched from an average distance of 5 miles, another third from 10 miles, and the last third from 15, the total cost per day would be $20880 \text{ lbs} \div 1200 \text{ lbs} \times \frac{1}{3} (5 + 10 + 15 \text{ miles}) \times 9 \text{ d.} = 1566 \text{ d.}$, that is, over 38 percent of the legion's cost (before Domitian: $\frac{1489950 \text{ d.}}{365 \text{ days}} = 4082 \text{ d. per day}$). Let us call it a third. For large armies on campaign we should add much equipment and baggage but for light-armed small infantry units we must subtract the cost of those days' supplies they could carry with them.

(22) C. R. WHITTAKER, in a most enlightening article in *Imperial Revenue, Expenditure and Monetary Policy* ..., ed. C. KING, Oxford, 1980, p. 8, is the most recent scholar to be puzzled by the extra cost of Roman imperial wars (he explains it by supposing units at other times were under strength — true, but neither sufficient nor here substantiated). For the equation "wars are the fathers of taxes" and further discussion of that and transport costs, see my *Roman Government's Response to Crisis*, New Haven, 1976, p. 104 ff. For the view that the emperors could have afforded expansion but decided against a larger army for non-economic reasons, see most recently A. MOCZY, *Zur Entstehung und Eigenart der Nordgrenzen Roms* (Vorträge der Rheinisch-Westfälische Akad. G. 229), 1978, p. 17 ff. But Moczy takes no account of war-time extra costs.

APPENDIX

Possible costs of the Roman imperial army (including the units stationed in Rome, but excluding the navy), where *BP* is the Base Pay of the legionary.

Legions of ?5280 ? Develin (1971), p. 689 discusses pay-ranks, without arguing the numbers of such in any detail ; *ibid.*, 691 based on Brunt (1950), p. 55, for the pay of centurions. Their figures produce the following :

4859 men each paid 1 BP, excluding	300 sesquiplicarii	(450 BPs total)
	60 duplicarii	120
	50 centurions	825
	9 primi ordines	201
	1 primus pilus	67
	1 praef. castr.	100
1763	421 men	1763 BPs
6622 BPs total for a legion		

Auxilia. I cannot find adequate evidence to show or even clearly suggest the proportion in auxiliary units of extra-pay soldiers. An attempt might begin with Dura papyri (e.g. nos. 3 and 9) or with Breeze in *ANRW*, II, 1 (Berlin/New York, 1974), p. 449. The proportion is perhaps less than here assumed, i.e. less than prevailed in the legions. Certainly the variety of auxiliary duty-titles or specialists is far less than in legions – but so is the total body of our information. Balancing the possibility of an overestimate in this regard, there is the suggestion that auxiliary pay began at $\frac{5}{6}$ BP. See M. Speidel, *JRS*, 63 (1973), p. 145. This suggestion, however, I am inclined to reject, not only for the sound reasons offered by D. J. Breeze, *ibid.*, 61 (1971), p. 131-135, but for other reasons that Breeze does not make quite explicit : if auxiliary Base Pay were so high as Speidel thinks, then the elite auxiliary units must be elite only in name not pay, or they would be paid more than legionaries. Against the first of these alternatives, see Breeze, *BJb.*, 174 (1974), p. 280, and Speidel, *JRS*, 60 (1970), p. 147, assuming pay differentials. On balance, I follow mostly the estimates of Watson (1969), p. 101, regarding pay, and of Holder (1980), p. 8, rounded upwards by A. R. Birley (1981), p. 43, regarding unit sizes.

in a quingenary infantry cohort, at $\frac{1}{3}$ legionary Base Pay,

$$\frac{1}{3} \times \frac{500}{5280} \times 6622 = 209 \text{ BPs}$$

in a milliary (ca. 1000-man) infantry cohort,
twice the above, i.e. 418 BPs

in a *cohors quingenaria equitata* (380 ? infantry at $\frac{1}{3}$ legionary Base Pay plus ?120 cavalry at $\frac{1}{2}$ legionary Base Pay ?)

$$\frac{1}{3} \times \frac{380}{5280} \times 6622 = 159$$

$$\frac{1}{2} \times \frac{120}{5280} \times 6622 = \frac{75}{234 \text{ BPs}}$$

in a *cohors milliaria equitata* (with ?240 *equites*),

twice the above, i.e. 468 BPs

in a quingenary (ca. 500-man) ala, at $\frac{2}{3}$ legionary Base Pay,

$$\frac{2}{3} \times \frac{500}{5280} \times 6622 = 418 \text{ BPs}$$

in a milliary (ca. 800-man) ala at same pay-rates as above,

$$\frac{2}{3} \times \frac{800}{5280} \times 6622 = 669 \text{ BPs}$$

Praetorians. Regarding size of units, see Watson (1969), p. 17 ; on pay, *ibid.*, 98 and Brunt (1950), p. 55, with Develin (1971), p. 691 proposing rather $3\frac{1}{3}$ not $2\frac{1}{3}$ BP as the praetorians' Base Pay

cohorts of 500 men each at $2\frac{1}{3}$ BP = 1167×10 cohorts (actually 9-16) = 11667
officers per cohort = ?30 at $5 \times \text{BP} + 15$ at $6 \times \text{BP} = 240 \times 10$ coh. = 2400

(rounded) 14000

Vigiles and urban cohorts. For the totals of men, see Brunt (1950), p. 55 and Develin (1971), p. 691, with Watson (1969), p. 99 preferring a higher figure ; for pay, Brunt and Develin *loc. cit.* and Watson (1969), p. 98, thus yielding a total of 7000 with the legionary BP and ?similar ratio of officers to men, for the vigiles, and 2000 for the urban cohorts at $1\frac{2}{3}$ BP

$$\text{vigiles : } \frac{7000}{5280} \times 6622 = 8779 \text{ BPs}$$

$$\text{urban cohorts : } \frac{2000}{5280} \times 6622 \times 1\frac{1}{3} = 4180 \text{ BPs.}$$

Totals. The figure for the legions is an average. Holder (1980), pp. 217-240 supplies the figures for auxilia in the period Vespasian-Trajan. Therefore, supposing

$$30 \text{ legions} \times 6622 = 198660 \text{ BPs}$$

$$98 \text{ alae quing.} \times 418 = 40964$$

8 alae mill.	× 669	=	5352
224 coh. quing.	× 209	=	46816
125 coh. quing. eq.	× 203	=	29250
11 coh. mill.	× 418	=	4598
17 coh. mill. eq.	× 468	=	7956
praetorian guard			14000
vigiles			8779
urban cohorts			4180

360555 BPs, or 360,000 rounded.

Absolute costs. In the reigns of Domitian up to Septimius Severus', when 1 BP = 300 d., the armed forces excluding the navy cost 105 million d. In earlier reigns, with 1 BP = 225, the total is 78,750,000 within a total budget that T. Frank (*op. cit.*, p. 53) reckons at 300-375,000,000 under Vespasian.