

R-1758-1-ARPA
August 1975

The Social Cost of Maintaining a Military Labor Force

Richard V. L. Cooper

A Report prepared for
DEFENSE ADVANCED RESEARCH PROJECTS AGENCY

Rand
SANTA MONICA, CA. 90406

The research described in this Report was sponsored by the Defense Advanced Research Projects Agency under contract No. DAHC15-73-C-0181. Reports of The Rand Corporation do not necessarily reflect the opinions or policies of the sponsors of Rand research.

R-1758-1-ARPA
August 1975

The Social Cost of Maintaining a Military Labor Force

Richard V. L. Cooper

A Report prepared for
DEFENSE ADVANCED RESEARCH PROJECTS AGENCY



PREFACE

This report was prepared as part of Rand's DoD Training and Manpower Management Program, sponsored by the Human Resources Research Office of the Defense Advanced Research Projects Agency (ARPA). With manpower issues assuming an ever greater importance in defense planning and budgeting, it is the purpose of this research program to develop broad strategies and specific solutions for dealing with present and future military manpower problems. This includes the development of new research methodologies for examining broad classes of manpower problems, as well as specific problem-oriented research.

This report is technical in nature and assumes that the reader has a good understanding of economics. It was written out of a concern for the failure of past analyses to deal fully with the issue of social costs under alternative manpower procurement policies. Although public attention tends to center on budget costs, the more relevant variable from the standpoint of public policy is social cost, since this is the price that society as a whole pays for maintaining a military labor force. For example, it is well recognized that since the draft imposed a "tax" on young men of military age, the budget cost of military manpower during the draft understated the "true" cost to society. However, previous studies--which are found primarily in the economics literature--have failed to deal adequately with the broader aspects of social cost.

The analysis presented here is offered as a first step toward a more comprehensive treatment of social costs under alternative manpower procurement policies. It shows that social welfare losses are possible both with and without the draft. Those associated with the draft are shown to be several times larger than those associated with a volunteer military, but recent significant force reductions raise the possibility that the military labor force will be reduced to a level below what is socially optimal. More generally, the analysis presented here suggests the importance of social cost as a measure useful to public policy.

This report, which supersedes R-1758-ARPA (published earlier under the same title), incorporates revised estimates of the wages paid to

military personnel under the draft. Although these revised estimates alter the estimates of the imputed social cost of the draft presented in the earlier version of this report, the basic methodology remains unchanged.

SUMMARY

Past research on the subject of the draft has not dealt fully with the social costs of alternative manpower procurement policies. Discussions of the economic or social costs tended to focus on the implicit "tax" that the draft imposed on young men of military age. The treatment of social costs was generally limited to vague references to the overutilization of labor encouraged by the low wages present during the draft.

A simple model of military labor supply and demand provides a useful starting point and shows that social welfare losses are possible both with and without the draft. In the first case, social welfare losses result because the low wages of the draft encourage the military to use more labor resources (and less capital) than that which is socially optimal. In the latter, too little labor may be used with a volunteer military, which also leads to social welfare losses.

Although this simple model of supply and demand provides a useful starting point, it tends to underestimate the social welfare loss under the draft and to overestimate that with a volunteer military. Perhaps most important, it fails to capture fully the social costs of the draft since conscription selects individuals without regard for supply price. Moreover, individuals who do not serve in the military may also pay a cost in the form of draft-avoidance expenditures and reduced employment opportunities.

Some simple assumptions suggest that the social welfare loss under the draft would be more than \$2.4 billion per year in 1973 dollars while that with a volunteer military would be less than \$1.5 billion.

ACKNOWLEDGMENTS

I am indebted to my Rand colleagues Craig Foch, Charles Phelps, and Charles Robert Roll, Jr. for their many helpful comments, suggestions, and ideas and for their careful reading of several earlier drafts of this report. I would also like to thank Jeanne Dunn for her editorial guidance.

CONTENTS

PREFACE	iii
SUMMARY	v
ACKNOWLEDGMENTS	vii
Section	
I. INTRODUCTION	1
II. A SIMPLE MODEL OF SUPPLY AND DEMAND	3
III. EXTENSIONS OF THE SIMPLE MODEL	7
A. The Military as a Discriminating Monopsonist ...	7
B. The Military as a Constrained Monopsonist	8
C. Military Labor Supply Under the Draft	10
IV. MEASURING THE APPROPRIATE SOCIAL COST	15
V. CONCLUSIONS	20
APPENDIX	23
BIBLIOGRAPHY	31

I. INTRODUCTION

Past research on the subject of the draft has failed to adequately consider the economic, or social, costs of alternative manpower procurement policies.¹ Although the economics literature provided valuable guidance on the budget implications of a volunteer military, it tended to treat the removal of the draft as primarily a question of tax burden shifting. Discussions of social costs were generally confined to vague references to the overutilization of labor resources encouraged by the low wages which characterized the draft era.²

¹By "economic" cost, I mean the opportunity cost to *society*, in the form of productive civilian output foregone, of labor employed by the military; by "social" cost, I mean the opportunity cost to the *individual* of being employed by the military. To the extent that positive (negative) wage premiums for the military are required, the social costs of labor employed by the military will be larger (smaller) than the economic costs. Traditionally, and empirically, the economic cost of military labor has tended to be interpreted as the alternative civilian wage, while social cost has the straightforward interpretation of the individual's reservation wage. This distinction between social and economic costs poses certain special problems when evaluating the "cost" of labor under the draft, an issue which is discussed at some length later in this report. Briefly, the argument is that so long as the draft wage is less than an individual's reservation wage, the individual is encouraged to engage in activities designed to avoid joining the military. Such activities frequently involve real resource costs (e.g., medical expenses, legal expenses, going to school, fleeing the country, etc.), so that economic costs include more than just alternative civilian wages. As a result, it becomes difficult to disentangle "social" and "economic" costs. With this in mind, the remainder of this report addresses the broader concept of *social* costs.

²There are two major exceptions. Sjaastad and Hansen [22], in measuring the conscription "tax" incurred by young men of military age, also consider the "costs of collection" of that tax, where such costs are primarily those associated with draft avoidance. Hansen and Weisbrod [9] address both the "distributive" and "allocative" costs of the draft, where the former center on the question of tax burden shifting and the latter include some of the costs incurred because of (1) restrictions on labor mobility, (2) uncertainties about being drafted, (3) and high labor turnover. (On the other hand, the only "overemployment" of labor considered by Hansen and Weisbrod is that incurred because of a larger number of individuals in training--that is, they hold the number of labor efficiency units constant.)

Borcherding [3] was the first to recognize that there might be social welfare losses associated with a volunteer military as well-- losses arising from an underemployment of military labor in the absence of the draft, given the upward-sloping nature of military labor supply. Borcherding argues further that it is difficult to determine *a priori* which welfare loss is larger--that associated with the overemployment of labor during the draft or the underemployment of labor with a volunteer military. As manpower strengths are reduced in the face of increasing costs, Borcherding's argument assumes a potential importance, since such reductions could well lead to a military labor force smaller than that which is socially optimal.

It would therefore seem appropriate to reconsider carefully the social costs associated with draft and no-draft military forces.¹ It will be shown below that social welfare losses from an underemployment of military labor remain a distinct possibility with the volunteer force, but that these costs are considerably less than the social welfare losses incurred under the draft.

¹Other analyses include Altman and Fechter [2], Fisher [6], Knapp [14], and Oi [18].

II. A SIMPLE MODEL OF SUPPLY AND DEMAND

Consider first a simple model of military labor supply and demand, such as that used by Borcharding. Assume for the present that military labor supply and demand can be stated in terms of labor efficiency units, so that the demand for labor can be represented by DD and the supply of labor can be represented by SS', as shown in Fig. 1.¹

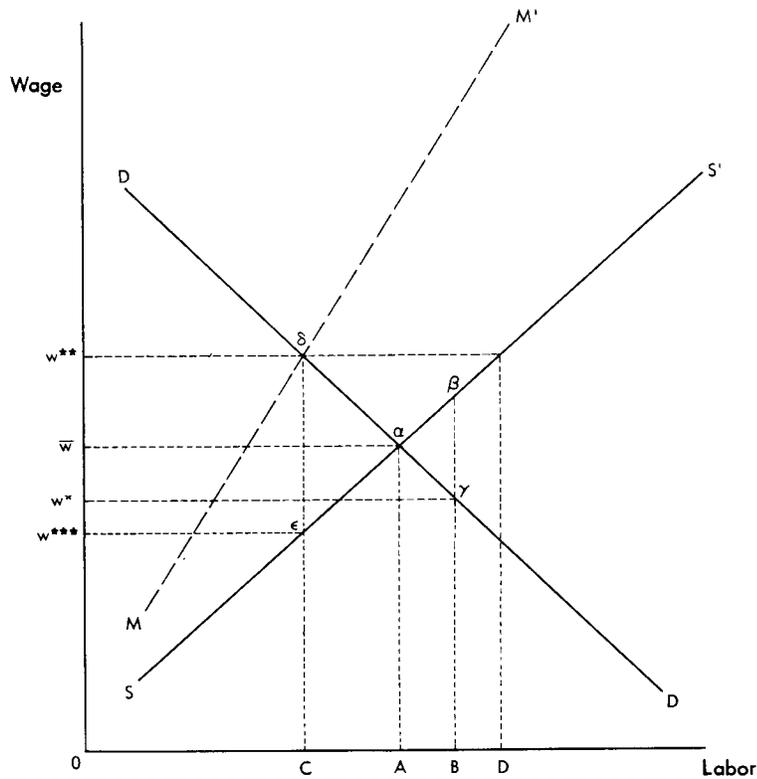


Fig. 1—Simple model of military labor supply and demand

Assuming that the military responds to the budget costs of factor inputs, not to the supply prices, the draft will lead to an overemployment

¹As will be shown in Section II, assuming that the supply curve can be represented in terms of efficiency units results in certain problems when measuring the effect of the draft on the employment of labor. For the present, however, these difficulties will be ignored.

of labor if the draft wage is less than the market-clearing wage.¹ For example, if the draft wage is w^* in Fig. 1, then OB labor resources will be demanded, which exceed the optimum amount OA by AB.² Assume that the supply curve represents the social alternatives of labor resources (i.e., the social cost) and that the demand curve represents the value of labor resources to the military.³ The social welfare loss resulting from this overemployment of labor under the draft is then given by the area $\alpha\beta\gamma$ in Fig. 1.⁴

Alternatively, since the military faces an upward-sloping supply curve for labor in the absence of the draft, a volunteer force will

¹Borcherding argues that if the military responds to the supply price of labor rather than to the budget cost, then draft and volunteer forces yield essentially the same results--because under both scenarios, OA labor resources will be demanded. However, it will be shown later that this is correct only if the draft discriminates such that those at the low end of the supply curve are drafted first, for the notion of "supply price" is not well defined if the military selects individuals at random along the supply curve.

²Areas will be shown in italics; distances will be shown in roman type.

³Social alternatives will be defined to include tastes--that is, individual preferences for specific employment--as well as alternative employment opportunities (see footnote 1, p. 1). The importance of this assumption will become clear shortly.

⁴Recognizing that there are some difficulties in interpreting consumer surplus graphically, I will nevertheless proceed to assume that consumer surplus can be approximated as the area under the demand curve less total wage payments and that producer surplus can be approximated as total wage payments less the area under the supply curve. (Note, further, that although consumer and producer surpluses usually refer to the market for final goods, here they refer to factors of production.) This enables us to calculate the social welfare losses from over- or underemployment as

$$\int_{L_0}^{L^*} [D(L) - S(L)]dL,$$

where $D(L)$ is the demand for labor, $S(L)$ is the supply of labor, L^* is the optimal level of employment, and L_0 is the actual employment of labor in the military.

For a discussion of consumer surplus, see Hicks [10], Hicks [11], and Mishan [17]. For further discussion, particularly with respect to some of the difficulties involved, see Samuelson [21].

result in an underemployment of labor since the marginal outlay curve MM' lies above the supply curve SS' . (That is, if one is to argue that the military responds to budget costs under the draft, one must also assume, for consistency, that they will do likewise without the draft.) The welfare loss from this deadweight burden is therefore given by the area $\alpha\delta\epsilon$.¹

To gain some notion as to the relative magnitudes involved, assume that the elasticity of supply is 1.25, that the elasticity of demand is 1.0, and that the draft wage w^* is 85 percent of the market-clearing wage \bar{w} .² Under these assumptions, the social welfare loss from the overemployment of labor under the draft (the area $\alpha\beta\gamma$) is 2.6 percent of the equilibrium wage payment (the area $OA\alpha\bar{w}$)³ whereas that from the underemployment without the draft (the area $\alpha\delta\epsilon$) is 8.1 percent. Assuming that the \$18.1 billion spent for military pay and allowances in 1973 approximates the equilibrium wage payment, these social welfare losses would amount to roughly \$0.5 billion and \$1.5 billion for over- and underemployment, respectively.

¹Note, however, that if the military also faces an upward-sloping supply curve for capital and if the elasticity of demand for national defense with respect to price is less than one, the social welfare loss from an underemployment of labor will be less than $\alpha\delta\epsilon$. In particular, if the supply curves for capital and labor are identical, if the demand curves for capital and labor are identical, and if the demand for national defense is completely price inelastic, then there is no social welfare loss since OA labor resources will be demanded.

²As will be shown in the next section, one of the important difficulties in using this simple model is its failure to capture the effects of the distinction between first-term and career labor. Although discussion of these effects generally can be postponed until the next section, the calculation of w^* does require recognition of the first-term/career distinction. That is, since w represents an average of first-term and career wages and since the draft had its primary effect on the wages for first-termers, w^* must be calculated as an average of w_f^* , the draft wage for first-termers, and \bar{w}_c , the market wage for careerists. Assuming that the w_f^* was about 70 percent of the market-clearing wage for first-termers (consistent with the Gates Commission estimate) and that first-termers made up about 65 percent of the force, w^* can be estimated as being close to 85 percent of \bar{w} . Details are in the Appendix.

³Since the elasticity of demand was assumed to be one, note that $OA\alpha\bar{w}$ equals $OB\alpha w^*$.

These results suggest that the volunteer forces might have larger social welfare losses than a draft-induced force. However, if the analysis is extended to include military pay mechanisms and the military labor force structure, then it becomes clear that this simple model leads to an overestimation of the social welfare losses resulting from the volunteer force and an underestimation of those from the draft.

These extensions are concerned primarily with the proper measurement of the areas $\alpha\beta\gamma$ and $\alpha\delta\epsilon$. It will also be shown that an equally, if not more important, shortcoming of the basic model arises from the method of measuring social costs during the draft. In particular, viewing the social cost of labor during the draft as the area under the supply curve leads to an underestimate of the cost of the draft, since the supply curve is not an accurate measure of the social cost of labor employed by the military during the draft and since the cost of the draft also includes costs incurred by those not employed by the military.

Section III outlines some extensions of the basic model and Section IV deals with the question of measurement.

III. EXTENSIONS OF THE SIMPLE MODEL

The simple model outlined above provides a basic framework for measuring the social cost of maintaining a military labor force. Though failing to capture fully the effects of manpower procurement policy on social costs, many of the shortcomings of this simple model of supply and demand can be handled by extending the basic framework, *if one assumes that the draft selects first those who are farthest down on the supply curve.*

A. THE MILITARY AS A DISCRIMINATING MONOPSONIST

To the extent that the military acts as a discriminating monopsonist, the marginal cost curve for labor will lie between SS' and MM' and the area $\alpha\delta\epsilon$ will be correspondingly smaller.¹ In contrast to Borcherding's assumption that wage discrimination is unlikely, the military services engage in a number of practices which enable them to discriminate, albeit crudely, according to supply price. Consider the following wage variations.

Enlistment bonuses for the combat arms occupational specialties are limited to individuals who are high school graduates and who score average or above average on the mental aptitude examinations, those individuals one would expect to have higher reservation wages. Similarly, those with higher mental aptitude scores and educational achievement generally receive the better jobs. Finally, recruiters are usually authorized only a limited number of slots for the shorter enlistment tours, with the result that these shorter enlistments are given only to those individuals who appear otherwise reluctant to join--hence, those with higher reservation wages.² These are but a few of the many ways the military has of discriminating according to supply price.

¹In the limit, the marginal cost curve for the perfectly discriminating monopsonist equals the supply curve--i.e., the average cost curve for the ordinary monopsonist. See Robinson [20].

²For example, the Army has limited itself to about 20 percent two-year enlistments. Similarly, the Office of the Assistant Secretary of Defense (Manpower and Reserve Affairs) has authorized the six reserve components to offer no more than 20 percent three- and four-year reserve enlistment tours (the standard reserve commitment is six years).

Although the military is far from being a perfectly discriminating monopsonist, these practices nevertheless suggest that the marginal cost curve lies to the right of MM' in Fig. 1, so the area $\alpha\delta\epsilon$ is correspondingly smaller.¹ To illustrate the effect on this area, suppose that the marginal cost curve taking this partial discrimination into account lies halfway between SS' and MM' .² This reduces the social welfare loss of underemployment by nearly three times--from 8.1 percent of the equilibrium wage payment to 2.8 percent.

B. THE MILITARY AS A CONSTRAINED MONOPSONIST

The calculation of the deadweight burden of the volunteer force from the simple model is based on the assumption that, since the supply curve for labor is upward sloping, the average wage curve is also upward sloping. However, assuming that the average wage curve actually faced by the military is upward sloping over the *entire range* of supply offerings ignores a fundamental aspect of the entire volunteer debate.

In particular, the Gates Commission argued that first-term military wages should be raised to a level "comparable" with what is found in the civilian sector, irrespective of the volunteer force.³ Therefore, the military is constrained as a monopsonist since it does not face the economic supply curve SS' in Fig. 2, but instead faces the political-economic "supply" curve w_cS' or $w_c dS'$ in Figs. 2a and 2b, respectively.⁴

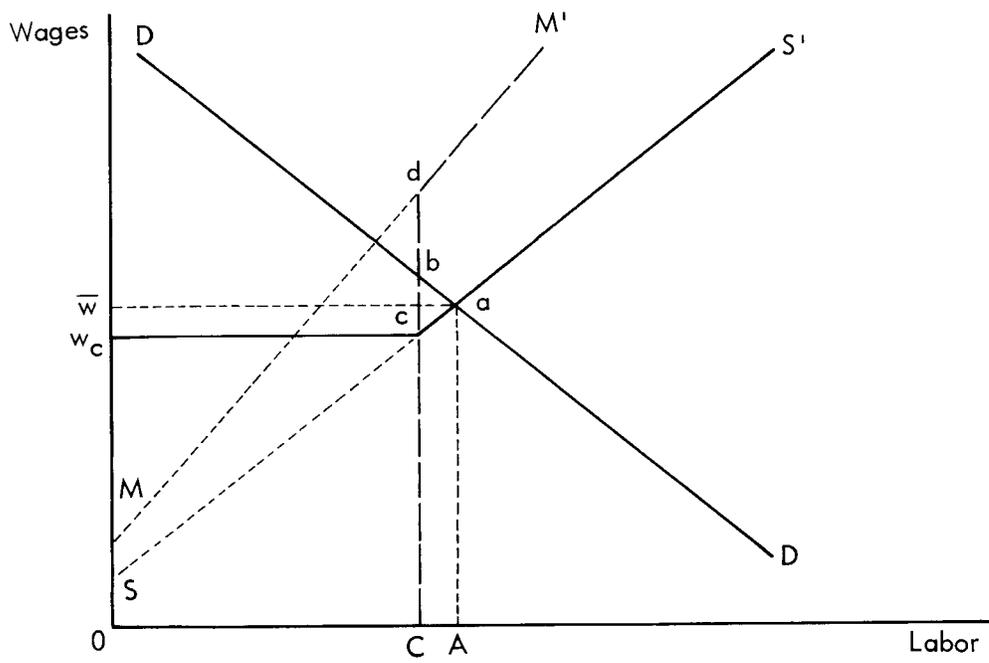
The principal issue, then, is how the so-called "comparable" wage w_c compares with the market-clearing wage \bar{w} . If the "comparable" wage equals the market-clearing wage, then the volunteer force does not lead to a social welfare loss. Alternatively, if the comparable wage does

¹Note that although the perfectly discriminating monopsonist solution leads to the socially optimal level of employment in the military (so that the social welfare loss is zero), this solution is not Pareto optimal since it transfers rents from the suppliers of military labor to the general taxpaying public, thereby making some better off at the expense of others.

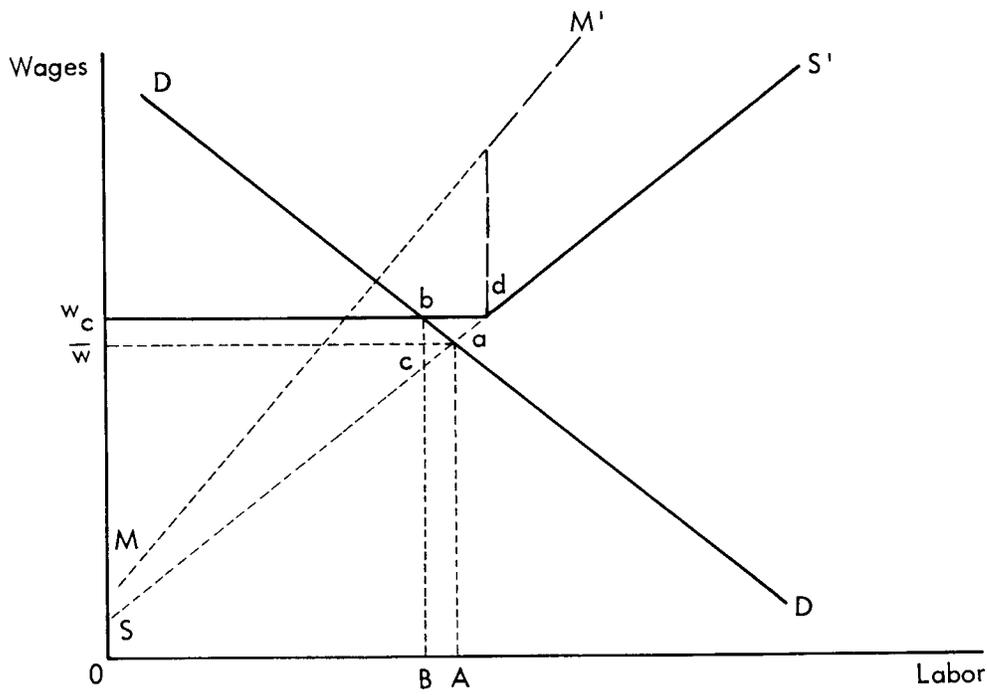
²See subsection B of the Appendix.

³What actually would have transpired in the absence of the volunteer force is, of course, open to debate.

⁴This political constraint is essentially the traditional problem of a minimum wage imposed on a monopsonistic employer. See, for example, Alchian and Allen [1], pp. 402-403.



(a) $w_c < \bar{w}$



(b) $w_c > \bar{w}$

Fig. 2 — The supply of labor without the draft

not equal the market-clearing wage, an underemployment of labor by the military results. In particular, if the comparable wage is less than the market-clearing wage, as shown in Fig. 2a, a social welfare loss of abc is incurred since only OC labor resources are employed. Similarly, a social welfare loss of abc will result if the comparable wage is greater than the market-clearing wage, as shown in Fig. 2b.

In general, though, it can be shown that the area abc in either Fig. 2a or 2b will be less than $\alpha\delta\epsilon$ in Fig. 1 if the comparable wage is greater than the monopsony wage, but less than the marginal cost to the monopsonist (that is, $abc < \alpha\delta\epsilon$ if $w^{***} < w_c < w^{**}$). Since the volunteer force was preceded by a sizable pay increase, it is probable that the comparable wage is greater than the monopsonistic wage (i.e., $w^{***} < w_c$). On the other hand, it is unlikely that the comparable wage exceeds the monopsonist's marginal cost because that would imply that the military is facing an *excess* supply of volunteers of more than 110 percent, a result consistent with neither the experience to date nor the Gates Commission estimates.¹ Thus, although an underemployment of labor remains a distinct possibility--indeed, a probability given the unlikelihood that w_c exactly equals \bar{w} --the social welfare loss emanating from this underemployment would appear to be considerably less than that implied by the simple supply and demand analysis shown in Fig. 1.

C. MILITARY LABOR SUPPLY UNDER THE DRAFT

Whereas open markets and the lack of barriers to entry and exit generally enable economists to think of labor supply and demand in terms of efficiency units (such as Borcherding's "labor time"), the special nature of the military labor system poses certain problems for measuring the effect of the draft on the utilization of labor.² Specifically, the military is a closed system where entry occurs only at the bottom. Empirically, it is useful to structure the military labor system into

¹See subsection C of the Appendix.

²For a discussion of labor aggregation functions, see, for example, Dougherty [5] and Bowles [4].

two components: first-term labor and career labor.¹ In this regard, it is noteworthy that whereas an upward-sloping supply curve for first-termers is new with the volunteer force, the military has always faced an upward-sloping supply curve for careerists.²

With no draft, the dichotomy between first-term and career labor is unlikely to lead to any analytical problems, so that one can state the supply curve for labor in terms of efficiency units, as reflected by SS' in Fig. 1. The reason is that without the draft, the wage rates for first-termers and careerists are both determined by market conditions, at least on the supply side. Each point on the SS' curve represents, in effect, the equilibrium employment of first-termers and careerists and the equilibrium first-term and career wage rates, so that SS' is the locus of points for the supply of efficiency units as a function of the cost per efficiency unit. Therefore, SS' can be viewed as the appropriate long-run supply of labor to the military in the absence of the draft, with the result that the area $\alpha\delta\epsilon$ of Fig. 1 represents the social welfare loss associated with the volunteer force (excepting, of course, the reductions in $\alpha\delta\epsilon$ to be expected if the military is either a discriminating or a constrained monopsonist).

In the presence of the draft, however, this model is no longer appropriate, for the draft had an asymmetric effect on the military labor system. In particular, the draft guaranteed a virtually unlimited supply of first-termers at a less than market-clearing wage on the one hand, while the wages for careerists were more-or-less market-determined on the other. The effect of this was to encourage an over-employment of first-termers (absolutely and relatively) because (1) first-term wages were below the market-clearing wage and (2) the marginal

¹This turns out to be a useful dichotomy since the major decision whether or not to remain in the military tends to occur at the first reenlistment point, with the practical result that retention rates for those beyond the first reenlistment point are several times higher than at that point. Empirically, it is usually convenient to define first-termers as those with less than four years of military service and careerists as those with four or more years of military service.

²Numerous special pay programs have been introduced to encourage military service beyond the initial period of obligation. Examples include "proficiency pay" for special skills introduced in the late 1950s and the "variable reenlistment bonus" in the mid 1960s.

cost of careerists was more than the average cost, whereas the marginal cost for first-termers was equal to or less than the average cost.¹

It is thus clear that one must explicitly consider at least a three-factor production function when analyzing the effect of the draft on the employment of labor (where the factors of production are capital, first-term labor, and career labor), instead of the two-factor production function implicit in the analysis to this point.² That is, whereas the labor aggregation function enables one to circumvent the problem of multiple labor inputs, the fact that the military faces such different markets on the supply side for first-termers and careerists (e.g., careerists are drawn solely from the pool of first-termers) necessitates treating these as separate inputs. Needless to say, the three-factor production function complicates the problem considerably. However, the following partial analysis serves to illustrate the effect of the draft on the social welfare loss when one considers the distinction between first-term and career labor inputs.

Given the presumed substitutability of first-term and career personnel, one would expect the demand for first-term labor to be more elastic than the demand for labor efficiency units. This can be seen in Fig. 3: DD can be interpreted as the demand for first-term labor as a function of first-term wages, assuming that career wages change proportionately (i.e., holding the ratio of first-term to career wages constant);³ $D_f D_f$ can be interpreted as the demand for first-term labor as a function of first-term wages, holding the supply function for career labor constant.

The welfare loss from the overemployment of first-termers under the draft is therefore given by the area *ade* in Fig. 3. Note that this is

¹Briefly, if the supply of careerists is a function of the number of first-termers, then increasing the number of first-termers reduces the wage that must be paid to careerists. Therefore, the marginal cost of first-termers may actually be less than the average cost.

²A four-factor production function, also including civilians employed by the military, would seem to be the most appropriate since the military faces substantially different markets for these three sources of labor input. For the purposes here, however, consideration of this added factor is not necessary.

³Note that the curve DD in Fig. 3 *implicitly* assumes that wages for first-termers and careerists move together. Therefore, DD in Fig. 3 is analogous to DD in Fig. 1.

under-employment of careerists,¹ the total social welfare loss--taking into account the effects on both first-termers and careerists--will be considerably more than the area $\alpha\beta\gamma$ implied in Fig. 1. Indeed, this could yield the result that social welfare losses arise from an *over-employment* of first-termers and an *underemployment* of careerists.

A simple example serves to illustrate the importance of recognizing the closed nature of the military labor system. Merely taking into account that first-termers bear the burden of overemployment (and assuming that the demand for first-termers is 50 percent more responsive to price than that for labor efficiency units) suggests that the social welfare costs of this overemployment of first-termers (the area *ade*) is in the neighborhood of 13.4 percent of the equilibrium wage bill, an amount almost five times as large as the amount implied by the area $\alpha\beta\gamma$ in Fig. 1.² This amounts to some \$2.4 billion in 1973 dollars.

¹This depends on the elasticities of substitution among factor inputs and the elasticity of demand for national defense.

²See subsection D of the Appendix.

IV. MEASURING THE APPROPRIATE SOCIAL COST

Up to this point, the calculation of social welfare losses has depended on the assumption that the supply curve approximates the gross social cost of maintaining a military labor force.¹ This is probably a reasonable assumption with a volunteer military, since the supply curve represents the mechanism by which labor resources are allocated under a price system. However, when labor resources are allocated other than by price, as with the draft, the supply curve has meaning as a measure of social cost only if the draft is structured so as to select first those individuals farthest down on the supply curve--a policy that has been rejected as socially inequitable²--or the entire age cohort is drafted.

The area under the supply curve fails as a measure of gross social cost under the draft for two reasons. First, to the extent that the draft selects individuals without regard to supply price, the area under the supply curve underestimates the social cost of labor employed by the military.³ Second, individuals whose supply price exceeds the draft

¹This discussion of social welfare loss (or, equivalently, net social cost) has not yet had to deal with the gross social cost because the area under the supply curve could be assumed to represent gross social cost. Therefore, net social cost could be defined relative to the competitive equilibrium. However, when resources are allocated other than by price, we must consider specifically the issue of gross social cost.

²In 1918, draft boards were expressly advised to draft first those individuals with the least-valued civilian alternatives. Explicit policies such as these were abandoned as socially repressive when peacetime conscription was reintroduced in 1950, even though more subtle means of discrimination (such as college deferments) were present prior to the lottery.

³This raises the issue of "supply price" versus alternative product foregone, since those individuals on the upper reaches of the supply curve are likely to be there as much for reasons of taste as for reasons of alternative employment opportunities. Nevertheless, it can be shown that there are real resource costs to conscripting these individuals since the larger the difference between the individual's supply price--no matter for what reason--and the draft wage, the more incentive he has

wage have an incentive to avoid the draft and their efforts to do so frequently involve the expenditure of resources. These incentives apply to the entire pool of draft eligibles, not just those employed by the military. Moreover, even if an individual is not drafted, he may face restricted employment opportunities since employers may be reluctant to hire individuals who are eligible for the draft. Therefore, the social cost of labor employed by the military underestimates the cost to society of maintaining a military labor force under the draft. Instead, the cost to society is the social cost of labor employed by the military plus whatever costs are incurred by those who do not enter the military.

Turning first to the measurement of the social cost associated with those employed by the military, the area under the supply curve ($OBbS$ in Fig. 4) underestimates the gross social cost of labor during the draft as long as any individuals with supply prices greater than w' are selected. Suppose, for the sake of illustration, that the draft is truly random and, moreover, that the draft represents the sole source of manpower. Those who are drafted will therefore be distributed evenly along the supply curve SS' .¹ Assuming that the total eligible cohort is given by the distance OC and that OB labor resources are demanded, the curve SS'' represents the *locus of supply prices* for those employed in the military during the draft.²

to engage in activities to avoid the draft (such as legal or medical means, fleeing the country, etc.). Indeed, Sjaastad and Hansen estimate that these "costs of collection of the conscription tax" may be one to two times as large as the tax itself.

¹The draft process has never been entirely random in this regard. For example, under the "oldest first" policy used prior to the lottery, one would expect two opposing effects. On the one hand, given that older individuals would be expected to have better civilian opportunities than those in their late teens, this policy would be expected to draw a proportionately larger share of individuals from the upper portion of the supply curve. On the other, the wide range of draft deferments allowed those on the upper end to more easily avoid the draft. With the introduction of the lottery, the reverse would be expected, since the lottery was a "youngest first" system, but most deferments were eliminated.

²That is, when the draft is structured so that all supply prices are proportionately represented, the curve SS'' is obtained simply by multiplying the distance from the vertical axis to the supply curve SS'

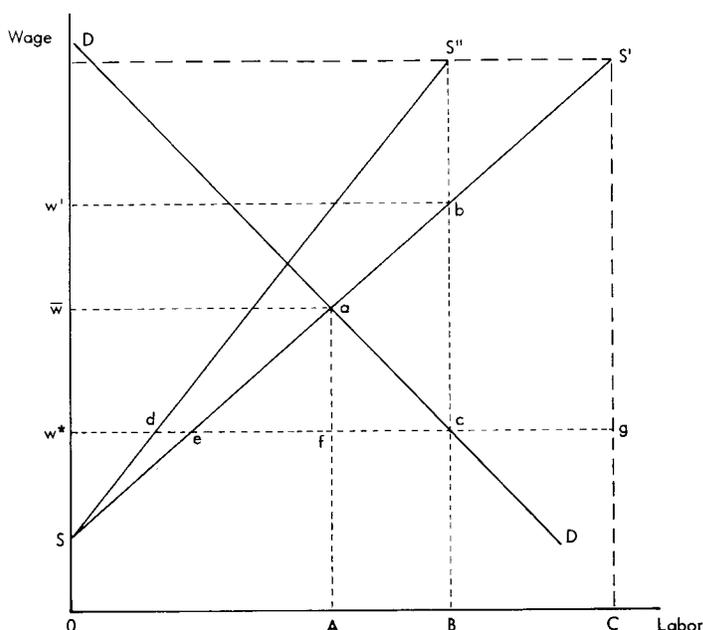


Fig. 4—Measuring the social cost of the draft

The gross social cost corresponding to the draft is then given by the area $OBS''S$ in Fig. 4, not the area $OBbS$, which is the standard measure of gross social cost (i.e., the area under the supply curve).¹

by the ratio OB/OC . Historically, of course, the draft has never been truly random (see footnote 1 on the preceding page) and conscripts have only partially fulfilled manpower requirements. The remainder was supplied by "voluntary" enlistments--some "true volunteers" (those on the S_e portion of the supply curve) and some draft-motivated (who, presumably, are located toward the lower end of the supply curve, but above w^*). Although this complicates the computation, it does not alter the basic approach. In particular, so long as any individual with a supply price above w' is drafted, the curve SS'' will lie to the left of the supply curve SS' . In general, if the draft selects more heavily from the upper end of the supply curve, SS'' will lie to the left of SS' as drawn in Fig. 4; conversely, selecting more heavily from the lower end will leave SS'' to the right of SS' as drawn (but still to the left of SS').

¹Although Hansen and Weisbrod recognize the basic issue, they assume that the area $OBbS$ represents the minimum foregone civilian output. This will be true only if supply price is perfectly correlated with the individual's alternative civilian wage. Therefore, although $OBbS$ represents the minimum social cost (where social cost is defined in terms of opportunity cost to the individual--see footnote 1, page 1), it does not necessarily represent the minimum civilian output foregone.

Therefore, the social welfare loss--or net social cost--from labor employed during the draft is not abc , as implied by the standard model, but is instead abc plus the area SbS'' .¹ Note further the seemingly paradoxical result that as the fraction of the cohort drafted nears unity, the curve SS'' moves closer to the curve SS' , thereby reducing the excess social welfare loss under the draft, over and above that associated with overemployment, since SbS'' becomes correspondingly smaller.²

As noted above, the social cost of labor employed by the military represents only part of the social cost of the draft because those not employed by the military may also bear costs. These latter costs may take two forms: (1) costs incurred to avoid the draft (e.g., remaining in school, fatherhood, medical and legal expenses, emmigration, etc.) and (2) costs incurred as a result of reduced employment opportunities for those who are draft eligible.³

Analytically, it is more difficult to measure the costs associated with those not employed by the military than the costs associated with those who are, since the former depend on a number of unknown parameters, including the individual's propensity to engage in draft avoidance measures, the probability of being drafted, and the reduction in employment opportunities as a result of being draft eligible, among others.⁴ For

¹Implicit here is the assumption that all individuals are of equal value to the military (or, at least, that an individual's value to the military is unrelated to his supply price). To the extent that the marginal productivity in military employment is higher for those with higher (lower) reservation wages, the social welfare loss will be less (more).

²It is interesting to note that most Western European nations with conscription employ a system of "universal service" in which the entire age cohort is drafted, thereby reducing the magnitude of these social welfare losses (although almost certainly at the expense of increased social welfare losses from increased personnel turnover).

³Sjaastad and Hansen's "costs of collection" are similar to these draft-avoidance costs. Hansen and Weisbrod's "labor mobility costs" would seem to include some draft-avoidance costs and some of the costs associated with reduced employment opportunities.

⁴Note that an individual's propensity to engage in draft-avoidance measures need not be perfectly related to supply price since it also depends on patriotism, willingness to serve, etc. Sjaastad and Hansen

example, an individual whose preferred employment is draft deferrable may "pay" little or no cost, whereas one whose preferred employment is not draft deferrable may pay a substantial cost.

In general, the maximum draft avoidance cost an individual will be willing to pay is the difference between his reservation wage and the draft wage, since paying more will leave him worse off (by definition) than if he joins the military. Similarly, the cost of reducing an individual's employment opportunities can be measured as the reduction in his returns (both pecuniary and nonpecuniary) caused by these employment restrictions. However, if such a reduction exceeds the difference between the individual's supply price and the draft wage, he will join the military, so that this difference again represents the maximum social cost imposed on him.¹

In general, the maximum draft avoidance cost above is not a very useful measure since most individuals will not expend this maximum. At the same time, Sjaastad and Hansen estimate that the "costs of collection" of the conscription tax are one to two times as large as the tax itself, thus implying that the additional social cost of the draft,² over and above that associated with overemployment, is far from negligible.

argue that an individual's propensity to avoid the draft is a function of the proportion of the eligible cohort which is drafted since the smaller the proportion, the greater the chance of avoiding the draft. (Of course, when the proportion is zero there is no need to engage in draft avoidance activities.) The introduction of the lottery reduced draft-avoidance costs: First, the lottery served to better identify the probability of being drafted so that those with high lottery numbers did not have to expend resources to avoid the draft. Second, it reduced the eligibility "window" from several years to one year. Third, the average supply price was reduced since the lottery changed the draft from an "oldest first" system to one of "youngest first."

¹The aggregate maximum social cost from draft avoidance and reduced employment alternatives is therefore given by the area egS' in Fig. 4, where an amount equal to dcS'' is borne by those employed by the military and an amount equal to egS' less dcS'' is the maximum borne by those not in the military.

²The size of the conscription tax is something between $w^*f\bar{aw}$ and w^*cbw' in Fig. 4. The ambiguity arises because it is not clear how Sjaastad and Hansen's 2.5 million force compares with OA and OB.

V. CONCLUSIONS

The system of manpower procurement clearly has a substantial effect on the social cost of maintaining a military labor force. Recognizing this, considerable effort during the sixties and seventies was devoted to studying the effects of the draft. Although these efforts undoubtedly played a substantial role in the ultimate disposition of the draft, treatment of the full implications of manpower procurement policy is noticeably incomplete.

Determining the social costs of alternative procurement policies is a difficult task, both theoretically and empirically. As a result, past efforts have tended to focus only on specific pieces of the system, such as the implicit tax imposed on young men of military age, rather than on the more general issue of social costs. The approach presented here, though admittedly incomplete, is offered as a first step toward a more comprehensive treatment of the social costs of maintaining a military labor force under alternative manpower procurement policies.¹

A simple model of labor supply and demand provides a useful starting point and shows that social welfare losses are possible under both draft-induced and voluntary forces. However, this simplified analysis tends to underestimate the cost of the draft and to overestimate the cost of a volunteer military so that social costs appear at first to be larger without the draft than with it, whereas a more careful analysis shows just the reverse.

In a narrow sense, one can think of social welfare losses as arising from either an over- or underemployment of labor by the military. The simple supply and demand analysis overestimates the cost of a volunteer military in this case, because it fails to recognize the military

¹This analysis does not deal with the externalities, positive or negative, that might accompany alternative manpower procurement policies. For example, it has been argued (mostly in the sociological and political science literature) that some positive externality is gained by drafting those who would otherwise not join the military. See, for example, Goldich [8]. Others have argued that a negative externality results from using coercion as a means for allocating resources. These will surely continue to be topics for further debate.

as a discriminating or constrained monopsonist. At the same time, it provides a downward-biased estimate of the social cost from overemployment under the draft because it fails to recognize that first-term labor bore most, if not all, of the burden of the draft.

In a broader sense, the social welfare loss of the draft is more than that associated with an overemployment of labor. In particular, one must recognize (1) that the area under the supply curve does not provide an accurate measure of social cost since the draft selects without regard for supply price and (2) that the social cost of the draft includes more than just the social cost of labor employed by the military since those who do not enter the military may expend resources trying to avoid the draft or may "pay" a cost in the form of reduced employment opportunities in the civilian market.

Under some simple, but perhaps not too unreasonable assumptions, the analysis presented here suggests that the social welfare loss with a volunteer military is likely to be considerably less than \$1.5 billion, as measured in 1973 dollars, while that associated with the draft would be larger than \$2.4 billion.¹ More generally, this analysis points to the importance of the methods for measuring social costs and the need for more comprehensive treatment of these costs as an input to public policy.

¹That is, the cost of underemployment with the volunteer force was estimated as \$1.5 billion from the simple supply and demand analysis. To the extent that the military is either a discriminating or a constrained monopsonist, this amount would be correspondingly less. Conversely, \$2.4 billion was estimated as the social cost of overemployment under the draft, recognizing that first-term labor bore most, if not all, of the burden of the draft. To the extent that the draft selects individuals other than by supply price, this amount would be considerably larger.

APPENDIX

A. CALCULATING THE SOCIAL WELFARE LOSSES SHOWN IN FIG. 1

To calculate the areas $\alpha\beta\gamma$ and $\alpha\delta\epsilon$ in Fig. 1, begin by assuming that the supply elasticity is 1.25 (consistent with the Gates Commission) and that the demand elasticity is 1.0 (an arbitrary but perhaps not too unrealistic assumption) and normalize such that $OA = 1.0$ and $\bar{Ow} = 1.0$.¹ The military labor supply and demand curves are then given as

$$\text{supply: } w = S(L) = L^{0.8} \quad (1)$$

$$\text{demand: } w = D(L) = L^{-1} \quad (2)$$

The amount of labor employed without the draft, OC , can be found by identifying the intersection of DD and MM' , where the marginal cost curve MM' is given from Eq. (1) as

$$\text{marginal cost: } w = MC(L) = 1.8L^{0.8} \quad (3)$$

Solving Eqs. (2) and (3) simultaneously yields $OC = 0.72$, in contrast to the socially optimal amount of 1.0 units of labor.

The area $\alpha\delta\epsilon$ can then be found by integration:

$$\alpha\delta\epsilon = \int_{0.72}^{1.0} [D(L) - S(L)]dL = \int_{0.72}^{1.0} L^{-1}dL - \int_{0.72}^{1.0} L^{0.8}dL = 0.081$$

To calculate the area $\alpha\beta\gamma$, assume $w^* = 0.85$.² From the demand curve in Eq. (2), 1.18 labor units will be demanded under the draft. The

¹Note that an elasticity of demand equal to one is consistent with a Cobb-Douglas production function, holding the level of output constant.

²While wages for first-term personnel were below the market-clearing wage during the draft, wages for careerists were approximately comparable to those found in the civilian sector. Therefore, w^* is calculated as

area $\alpha\beta\gamma$ can then be found by integration:

$$\alpha\beta\gamma = \int_{1.0}^{1.18} S(L)dL - \int_{1.0}^{1.18} D(L)dL = 0.026$$

To put these figures in some perspective, note that the equilibrium wage payment to labor equals $OA \times \bar{Ow}$ which, in turn, equals one. Therefore, given the previous assumptions, the social welfare loss under the draft $\alpha\beta\gamma$ equals 2.6 percent of the equilibrium wage payment whereas the social welfare loss under the volunteer force, the area $\alpha\delta\epsilon$, equals 8.1 percent of the equilibrium wage payment. If we assume that the \$18.1 billion in basic pay and allowances for active-duty military personnel in fiscal 1973 approximates the equilibrium wage payment, then the social welfare loss under the draft can be approximated as \$500 million and that under the volunteer force as \$1500 million (i.e., 0.026×18.1 and 0.081×18.1 , respectively).

B. THE MILITARY AS A DISCRIMINATING MONOPSONIST

Although it is difficult to determine the extent to which the military acts as a discriminating monopsonist, suppose, for the sake of illustration, that the marginal cost curve for labor (taking this discrimination into account) lies half-way between the curves SS' and MM' in Fig. 1. That is, since

$$SS': w = L^{0.8}$$

$$MM': w = 1.8L^{0.8}$$

then

$$MC: w = 1.4L^{0.8} \tag{4}$$

a weighted average of first-term and career pay. In particular, since the Gates Commission estimated that first-term pay was about 30 percent below the market-clearing wage and since first-termers made up between 60 and 65 percent of the enlisted force during the draft, w^* is approximately equal to 0.85.

Equating the marginal cost of labor with the demand for labor (i.e., solving Eqs. (2) and (4) simultaneously) yields 0.83 as the employment of labor with the volunteer force, taking into account that the military can partially discriminate. The social welfare loss (s.w.l.) can then be calculated as

$$\text{s.w.l.} = \int_{0.83}^{1.0} [D(L) - S(L)]dL = 0.028$$

Again, note that this can be expressed as 2.8 percent of the equilibrium wage payment.

C. THE MILITARY AS A CONSTRAINED MONOPSONIST

As shown in Section III, the area *abc* in either Fig. 2a or 2b will be less than the area $\alpha\delta\epsilon$ in Fig. 1 if $w^{***} < w_c < w^{**}$. To begin with, $w^* < w_c$ since the principal result of the volunteer force legislation was to increase substantially the pay of first-term personnel. Although we cannot establish with certainty that $w^{***} < w_c$, such a result seems likely given the magnitude of the pay increase (about 40 percent for first-termers).¹

To show that $w_c < w^{**}$, we rely on the following indirect line of thought. In particular, if $w_c = w^{**}$, then we know from subsection A of the Appendix that OB (in Fig. 2b) equals 0.72. When OB = 0.72, we know from the demand function given by Eq. (2) that $w^{**} = 1.39$. From the supply function given in Eq. (1), we know that supply OD = 1.51 when $w^{**} = 1.39$. Therefore, the ratio of supply to demand when $w_c = w^{**}$ equals OD/OB = 2.10 which, when translated, means that the military would be facing an excess supply of 110 percent if $w_c = w^{**}$. Since this does not seem to be the case, we can conclude that $w^{***} < w_c < w^{**}$, so that the social welfare loss under the volunteer force is less than the area $\alpha\delta\epsilon$ in Fig. 1.

¹If $w^{***} < w^*$, then we can show with certainty that $w^{***} < w_c$ since $w^* < w_c$. Alternatively, if $w^{***} > w^*$, then we can only assume that the pay_c increase was sufficiently large such that $w^{***} < w_c$.

D. THE SOCIAL WELFARE LOSS FROM AN OVEREMPLOYMENT OF
FIRST-TERMERS: A SIMPLE EXAMPLE

The problem of calculating social welfare losses from the over-employment of labor under the draft is complicated considerably by the introduction of the first-term/career distinction. In particular, one needs to know the supply functions for first-termers and careerists, a labor aggregation function (since the military presumably demands efficiency units, not numbers of people), and the demand for labor efficiency units.

Although one cannot determine the social welfare losses without knowledge of these functions, the following simple but illustrative example provides a basis for comparison. In what follows, it is assumed that the general equilibrium solution is known *a priori*. We can then compare the results when a draft is imposed on first-termers with the results from the assumed general equilibrium solution.

To begin, assume that

- (i) the elasticity of demand for labor efficiency units, as before, equals 1.0, so that $w = L^{-1}$;
- (ii) we have a simple linear aggregation function where careerists are twice as productive as first-termers, so that $L = 0.5L_f + L_c$; and
- (iii) the average wage rate (per efficiency unit) w is simply a weighted average of first-term and career wages, so that $w = (L_f/L)w_f + (L_c/L)w_c$.

Assume further that the general equilibrium solution yields a force of 40 percent first-termers and 60 percent careerists, where first-termers are paid 0.5 and careerists are paid 1.0.¹ This assumption, together with assumptions (i)-(iii), yield a force of 0.5 first-termers and 0.75 careerists, so that total force size is 1.25 and the number of efficiency units is 1.0. Therefore, this "general equilibrium" solution is comparable with the situation given earlier in Fig. 1.

¹A recent study by Jacquette and Nelson [12] suggests that a force of about 40 percent first-termers and 60 percent careerists may not be too far off the mark.

Suppose further that

- (iv) the elasticity of supply of first-termers is 1.25, so that the supply function for first-termers is given by $w_f = 0.871L_f^{0.8}$;¹
- (v) the elasticity of demand for first-termers is 1.5, so that the demand curve $D_f D_f$ in Fig. 3 is given by $w_f = 0.315L_f^{-0.67}$;² and
- (vi) the supply curve for careerists is perfectly elastic (over the relevant range) at the wage $w_c = 1.0$.³

Therefore, we have the following system of equations

$$w = L^{-1} \quad (6a)$$

$$L = 0.5L_f + L_c \quad (6b)$$

$$w = (L_f/L)w_f + (L_c/L)w_c \quad (6c)$$

$$w_f = 0.871L_f \quad (6d)$$

$$w_f = 0.315L_f^{-0.67} \quad (6e)$$

$$w_c = 1.0 \quad (6f)$$

¹The constant 0.871 normalizes the supply curve for first-termers such that $L_f = 0.5$ when $w_f = 0.5$, consistent with the assumption above.

²That is, the "demand" curve for first-termers is given as a function of first-term wages, holding career wages constant. The constant 0.315 again normalizes the demand curve such that $L_f = 0.5$ when $w_f = 0.5$.

³Though certainly unrealistic, this assumption is not likely to affect the results substantially. Note further that a demand function for careerists is not necessary since it is given as the residual from Eqs. (6a) and (6e).

As noted previously, this yields the following solution

$$\bar{L}_f = 0.5$$

$$\bar{L}_c = 0.75$$

$$\bar{L} = 1.0$$

$$\bar{w}_f = 0.5$$

$$\bar{w}_c = 1.0$$

$$\bar{w} = 1.0$$

$$W = w_f L_f + w_c L_c = 1.0 \text{ (where } W = \text{total wage payment)}$$

Next, suppose that the draft imposes a first-term wage rate that is 70 percent of the market-clearing wage,¹ so that Eq. (6d) can be replaced by

$$w_f^* = 0.7\bar{w}_f = 0.35 \quad (6d')$$

Solving the system of Eqs. (6a-e), substituting in for (6d) as noted above, yields²

$$L_f^* = 0.854$$

$$L_c^* = 0.701$$

$$L^* = 1.128$$

¹The Gates Commission estimated that first-term wages would have to be raised by 40 percent to make them comparable with civilian pay. Thus, w_f^* equals about 70 percent of \bar{w}_f (i.e., $1 \div 1.4 = 0.7$).

²It is interesting that this solution yields a force of 55 percent first-termers, approximately the percentage of first-termers before the Vietnam War.

$$w_f^* = 0.35$$

$$w_c^* = 1.0$$

$$w^* = 0.886$$

$$W = 1.0$$

The social welfare loss associated with this solution can then be computed as the social welfare loss resulting from the overemployment of first-termers (the area *ade* in Fig. 3) plus that associated with the underemployment of careerists. The area *ade* can be computed from integrating Eqs. (6d) and (6e)

$$ade = \int_{0.5}^{0.854} S_f(L_f) dL_f - \int_{0.5}^{0.854} D_f(L_f) dL_f = 0.134$$

The social welfare loss is therefore at least 0.134.¹ Since total wage payments are 1.0, this implies that the social welfare loss resulting from an overemployment under the draft is at least 13.4 percent of the total wage payment (not the 5.2 percent obtained if one fails to take account of the first-term career distinction). Stated in 1973 dollars, the social welfare loss under the above assumptions would be on the order of \$2.4 billion, if one assumes that the \$18.1 billion wage payment approximates the equilibrium wage payment.

¹Plus whatever social welfare loss there is from the underemployment of careerists. Without more precise knowledge of the general system of equations, however, this social cost cannot be identified.

BIBLIOGRAPHY

1. Alchian, Armen A., and William R. Allen, *University Economics*, Wadsworth Publishing Company, Inc., Belmont, California, 1968.
2. Altman, Stuart H., and Alan E. Fechter, "The Supply of Military Personnel in the Absence of a Draft," *American Economic Review Proceedings*, 57 (May 1967), pp. 19-31.
3. Borcharding, Thomas E., "A Neglected Social Cost of a Volunteer Force," *American Economic Review*, 61 (March 1971), pp. 195-196.
4. Bowles, S. S., "Aggregation of Labor Inputs in the Economics of Growth and Planning: Experiments with a Two-Level CES Function," *Journal of Political Economy*, 78 (January/February 1970), pp. 68-81.
5. Dougherty, C.R.S., "Estimates of Labor Aggregation Functions," *Journal of Political Economy*, 80 (November/December 1972), pp. 1101-1119.
6. Fisher, Anthony C., "The Cost of the Draft and the Cost of Ending the Draft," *American Economic Review*, 59 (June 1969), pp. 239-254.
7. -----, "The Cost of Ending the Draft: Reply," *American Economic Review*, 60 (December 1970), pp. 979-983.
8. Goldich, Robert L., "The Need for Positive Change," *Military Review*, 53 (April 1973), pp. 44-53.
9. Hansen, W. Lee, and Burton A. Weisbrod, "Economics of the Military Draft," *Quarterly Journal of Economics*, 81 (August 1967), pp. 395-421.
10. Hicks, John, "The Generalized Theory of Consumers' Surplus," *Review of Economic Studies*, 13 (1945-46), pp. 68-74.
11. -----, "The Rehabilitation of Consumers' Surplus," *Review of Economic Studies*, 8 (February 1941), pp. 31-41.
12. Jacquette, David L., and Gary R. Nelson, *The Implications of Manpower Supply and Productivity for the Pay and Composition of the Military Force: An Optimization Model*, The Rand Corporation, R-1451-ARPA, July 1974.
13. Klotz, Benjamin P., "The Cost of Ending the Draft: Comment," *American Economic Review*, 60 (December 1970), pp. 970-978.
14. Knapp, Charles B., "A Human Capital Approach to the Burden of the Military Draft," unpublished Ph.D. dissertation, University of Wisconsin, 1972.

15. Miller, James C., III (ed.), *Why the Draft? The Case for the Volunteer Army*, Penguin Books, Inc., Baltimore, 1968.
16. Mishan, E. J., "What is Producers' Surplus?" *American Economic Review*, 58 (December 1958), pp. 1269-1282.
17. -----, "Realism and Relevance in Consumers' Surplus," *Review of Economic Studies*, 15 (1947-48), pp. 27-33.
18. Oi, Walter Y., "The Economic Cost of the Draft," *American Economic Review Proceedings*, 57 (May 1967), pp. 39-62.
19. -----, "The Costs and Implications of an All-Volunteer Force," in Sol Tax (ed.), *The Draft*, University of Chicago Press, Chicago, 1967.
20. Robinson, Joan, *The Economics of Imperfect Competition*, MacMillan & Co., Ltd., London, 1965.
21. Samuelson, Paul A., "Constancy of the Marginal Utility of Income," in O. Lange, et al. (eds.), *Studies in Mathematical Economics and Econometrics: In Memory of Henry Schultz*, University of Chicago Press, Chicago, 1942.
22. Sjaastad, Larry A., and Ronald W. Hansen, "The Conscription Tax: An Empirical Analysis," in *Studies Prepared for the President's Commission on an All-Volunteer Armed Force*, Vol. II, U.S. Government Printing Office, Washington, D.C., 1970.
23. *Report of the President's Commission on an All-Volunteer Armed Force*, U.S. Government Printing Office, Washington, D.C., 1970.