Professors and instructors

STONY BROOK WORKING PAPERS

no. 20

DEPARTMENT OF ECONOMICS

SOME NOTES ON THE FACULTY RESOURCE

AT A UNIVERSITY

Estelle James*

Working Paper No. 20

May 1970

Circulated by the
ECONOMIC RESEARCH BUREAU
State University of New York
Stony Brook, ~~N. Y. 11790~~
May 1970.

SOME NOTES ON THE FACULTY RESOURCE AT A UNIVERSITY

Estelle James*

Working Paper No. 20

May 1970

* Associate Professor of Economics, State University of New York at Stony Brook.

A complete list of Stony Brook Working Papers appears at the end of this paper.

Some Notes on the Faculty Resource at a University

The faculty is the largest single (non-student) resource at the University. Its use is shared among the multiplicity of University outputs--undergraduate and graduate education, research and administration, carried on in a variety of departments or fields. Faculty costs are also the most complex to measure. In this paper I report on the conceptual problems encountered in my case study of faculty allocation at the State University of New York (S. U. N. Y.), Stony Brook.

1. Stock versus flow interpretation of the faculty input. The faculty is the human capital of the University--the embodiment of part educational investment. As with physical capital, the present value of this stock may be found by discounting the future stream of expected benefits. Here, however, we are primarily concerned with the current flow of services and the current opportunity cost of this stock. Are we justified in using annual salaries as an index of the faculty's annual research and teaching services and do wage differentials reflect real differences in productivity?

2. Joint supply. Joint supply exists if two outputs can be produced more cheaply together than separately or, equivalently, if for the same outlay we can get a larger quantity (of one, without sacrificing any of the other) when they are produced jointly. When joint supply prevails, the cost of producing one good depends on whether we are producing the other good, and if so, in what quantity, and the charging of inputs to the various goods is, within limits, indeterminate. Under what conditions will this difficulty arise for the

faculty resource; conversely, what assumptions must we make in order to specify unambiguously the share of faculty costs attributable to various University activities?

3. Relative wage rates for teaching and research. Assuming that a cost allocation among functions is possible, how do we proceed to make this imputation? Specifically, are research and teaching remunerated at the same hourly rate, so that costs may be divided according to time spent on each?

4. Implementation. Once these conceptual problems have been solved, what information and/or assumptions do we need in order to calculate faculty costs for each activity?

I. Stock and Flow Problems

Wages are generally used to measure the marginal value and opportunity cost of labor. For faculty and other services hired on a long-term contractual or tenured basis, however, this equation may not hold for an arbitrarily-selected short-run time period; that is, in any given year, money costs to the institution and real social costs may not coincide.

Let us suppose in Case I that a professor is hired in a perfectly competitive market on a year-to-year basis for his current production of research and teaching (R and T), with no future commitment on either side and no uncertainty about his performance. Then, the annual wage (or rental price) of the professor represents his current value to the institution and his current opportunity cost, and wage differentials reflect differences in productivity among the faculty.[1]

At the opposite extreme, let us suppose in Case II that, once hired, professor and University are wedded for life, by legal or social barriers to mobility; they cannot be divorced or traded. The wage and performance terms are known, binding and specified in advance. Then, the University will pay, over his lifetime, his marginal value to the institution and his full opportunity cost, i.e. $\sum_{t=0}^{T} We^{-rt} = \sum_{t=0}^{T} VMPe^{-rt}$, but in any given year wages and services may not correspond.[2] For example, the University may initially invest in or lend to the professor, paying him more than his marginal product in return for relatively lower wages in another period. And the opposite, too, may occur. Since professor and University are irrevocably tied to each other, the link between current services or opportunity cost and current remuneration is broken. Furthermore, for a stable institution which is no longer hiring, faculty wages are a quasi-fixed cost which will not be reduced if T or R fall, so long as the University stays in business.

More typically, the employment commitment is asymmetrical: in Case III the University is tied to the professor by contract or tenure, but the professor is free to leave the University at any time. Thus the University makes a lifetime and the professor a yearly employment cloice. We abstract at the moment from the crucial incentive problem by assuming that the future stream of services as well as wages are known with certainty; only the duration of employment is uncertain. What are the implications for equilibrium annual costs?

The University, reaching its decision on the basis of lifetime wages and performance, will hire until $\sum_{t=0}^{T} We^{-rt} = \sum_{t=0}^{T} VMPe^{-rt}$, and faculty remuneration becomes a quasi-fixed cost for stable institutions. The professor, constantly reevaluating his decision, will switch to another institution as soon as the remaining $\sum We^{-rt}$ becomes greater at any other (sequential) combination of schools. This means that at no point is the University willing to be a "net lender" to its faculty, as it might have been in Case II, since it cannot be sure of recouping later on. The professor, on the other hand, may provide services which exceed his current remuneration and accept an income time stream which makes him a "net lender" to the University, knowing that he will afterwards be compensated; his willingness to do so varies inversely with his subjective discount rate. Thus, $\sum_{t=0}^{\bar{t}} We^{-rt} \leq \sum_{t=0}^{\bar{t}} VMPe^{-rt}$ where $\bar{t}$ varies from year 1 to $T-1$, and $\sum_{t=0}^{T} We^{-rt} = \sum_{t=0}^{T} VMPe^{-rt}$. When comparing annual W and VMP we may observe Pattern A, but never Pattern B.

current wages and differentials are no longer an accurate index of current performance. In particular, wages of young people may be less and of older people more than their VMP, so that higher wages paid to senior professors (who have been with the insiitution a long time) may not reflect higher productivity or opportunity cost (which helps to explain their relatively low mobility).

Once risk and uncertainty are added to the picture, the correspondence between wages and service becomes even more tenuous, since, ex poste, $\sum_{t=0}^{T} We^{-rt}$ may not equal $\sum_{t=0}^{T} VMPe^{-rt}$.

I shall digress in this and the following paragraphs to discuss the institution of tenure, which is closely related to my analytic problem. While this custom has been defended on grounds of academic freedom, it may spring in part from a desire by the faculty to protect itself from the penalties of obsolete training. The benefit of tenure is then the excess of wages over VMP in the professor's later years. The corresponding cost, as noted above, is the University's reluctance to pay his full VMP in his early years.

In a context of uncertainty, the potential loss to the non-tenured professor is heightened under this system, for the institution will shortly be forced to make an "all or nothing" decision about him and is therefore more likely to let him go than it would under a more flexible arrangement. Once he gets tenure, however, the risk to the individual concerning his future performance abruptly drops; he has shifted it to the University. Thus, we may view the tenured professor as buying, with his services, a package of wages plus insurance, and on these grounds we would expect that $E(\sum_{t=0}^{T} We^{-rt}) < E(\sum_{t=0}^{T} VMPe^{-rt})$, the divergence depending on the equilibrium risk premium established by the market.

The shifting of risk confronts us with the familiar "moral hazard" or incentive problem: Where performance is not exogenously determined but is under the individual's control, it may be adversely influenced by insurance. With tenure, in other words, a professor may not be induced to work up to full capacity. This reduces the efficiency of the system and raises the appropriate risk premium. On the other hand, shifting the individual's risk to the University has a pooling effect which may lower the necessary premium.[3] In either case, if the private risk premium exeeeds the socially optimal rate, the "right" amount of professors will not be supplied and we have an underinvestment in human capital.

II. Joint Supply

Once the total faculty resource has been measured, the next step is to study its utilization by different activities at the University -- undergraduate education, graduate training, research, and administration (UG, G, R and A). Here we encounter the joint supply problem: if costs and quantities of two products are interdependent, it may be impossible to specify a single unqualified division of inputs between them.[4] This difficulty may arise with respect to the faculty resource at a University because of direct interaction among outputs and diminishing returns to professorial specialization.

Direct interaction and externalities. Joint supply can clearly exist without fixed coefficients between outputs. However, the relationship among outputs may be subject to a similar but less extreme restriction stemming from externalities or direct interaction. For example, the research function (R) may serve as an input into the faculty's production of teaching (T) and conversely, research may be a by-product of certain kinds of instruction.

In higher education we find junior colleges which produce lower division courses only, liberal arts colleges which produce UG only, and research institutes which specialize in R. An asymmetry exists, however, since it is difficult to find advanced graduate training without R. Taking my cue from this observation, I assume a strong complementarity between G and R, the rationale being that faculty cannot teach G how to do R without doing R themselves. This interdependence in costs is, incidentally, supplemented by an interdependence in benefits, since a primary purpose of G is G's current of future R, so G and R may stand or fall together on grounds of demand as well as supply.

I shall build two alternative measures of the faculty cost of G: one (Figure I) assuming that the G-R trade-offs are continuously linear and the given amount of Research would have been undertaken with or without G; and the other (Figure II) assuming that R must be produced as a necessary input into G. According to the latter formulation, the faculty's G-R production frontier becomes backward-bending at a point such as E, which I assume to be the University's point of operations.

If R drops below this level the quantity of G must also fall; the marginal cost of G becomes infinite.

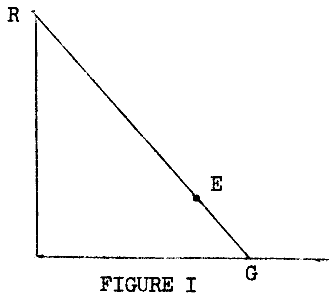


FIGURE I

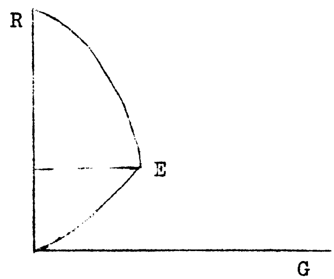


FIGURE II

UG, on the other hand, is treated as if it does not interact directly with either G or R. This separability is, of course, only defensible in a static model. If we look at a quantity--quality index of UG over time, clearly this depends on the accumulation of knowledge through prior R and G, just as current R and G will influence future UG classroom activity. In a dynamic model all these interactions would have to be considered. In my analysis, past R and G are exogenously given, current R and G are assumed to have a negligible direct impact on current UG, and a resource allocation choice must be made for the given period between these final products.[5]

<u>Diminishing returns to specialization.</u> A faculty member embodies a variety of characteristics or productive propensities which may qualify him for different activities, with diminishing returns to the time spent in each. He is, in effect, a microcosm of a multifactor economy, with a concave-to-the-origin (continuous or segmented) production frontier.

Allocating faculty costs by proportion of time spent on each activity, as I do, presumes that two professors spending half time in T and R have equivalent productivity to one specialized in R and another in T. When professors encounter diminishing returns to continuous concentration on a single activity, this assumption is violated. Cost allocations diverge from time allocations and diversified production is more efficient than specialization, requiring a more complex specification of real faculty inputs.[6]

Let us digress for a moment and suppose that smoothly functioning part-time markets existed for each talent. We might then see many professors attached to two or more specialized institutions--a phenomenon which has, in fact, developed, as exemplified by the connections between Stony Brook and Brookhaven National Laboratory, the Harvard - M.I.T. - Route 128 complex, and numerous consulting arrangements. Faculty could earn higher salaries and society would gain in efficiency when the faculty diversifies its activities, but this need not take place at the same institution. Because of the complementarity between functions, faculty costs to each specialized organization would depend negatively on the existence of the other. If pairs of R and T firms coordinated their hiring decisions, they would need to bargain over the sharing of the total wage bill and the productivity surplus.

In general, transactions costs have left incomplete this process of dual affiliation. The professor, as a conglomerate resource, is primarily tied to a single University. When full-time hiring is the rule and each professor embodies a non-linear production frontier, it becomes cheaper to carry on both activities at the same rather than separate insitutions, i.e., joint supply prevails for the University. The cost of the combined activities is then directly observable but the breakdown between R and T is not. Indeed, the University becomes the counterpart of the paired firms for whom this division is, to some degree, indeterminate.

The relative rewards for T and R and the shape of each person's production frontier will determine his optimal marginal rate of transformation $\left(\frac{MPP_T}{MPP_R}\right)$ and T/R mix under these circumstances. For some people, of course, complete specialization will thereby be dictated but for many diversification is advantageous. An incentive problem develops, with conflicting institutional and individual interests, if relative rewards of R and T are not equal for the University and the professor.

For efficient use of the faculty resource by the University, all diversified professors should have the same marginal rates of transformation in equilibrium. If different people face different reward structures, this condition may be violated. Then, the faculty input required for a given R or T will depend on the individuals directly involved and the division of responsiblity between them and the opportunity cost depends upon their (possibly non-optimal) utilization elsewhere. Furthermore, a rearrangement of duties would enable more R and T with the same personnel, so in this sense the marginal opportunity cost is zero.

Although $\frac{MPP_T}{MPP_R}$ should be equal for all professors, T/P should vary for individuals with different natural endowments; this is a simple application of the law of comparative advantage. Some people do indeed concentrate more heavily on R, others in T, and still others in administration, which enters into the production function of everything else. Since objective functions and relative rewards for R and T vary across institutions, people with similar propensities may tend to cluster together at schools emphasizing the activity in which they have a comparative advantage. Faculty production frontiers of different slopes continue, however, to coexist at the same institution. Then, if individual variation in T/R mix is restricted, e.g. by fixed teaching loads, professors will have different marginal rates of transformation in equilibrium and again the University will not be operating on its efficiency frontier.

Analytically, one can avoid the joint supply problem stemming from diversification by assuming that 1) some faculty production frontiers have slopes which optimally would and do result in complete specialization; and 2) a large proportion of the faculty at a given University have linear production frontiers with (the same) constant marginal rate of transformation equal to the relative rewards for R and T at that University. The institution's T/R mix is determinate then only if we assume it has a diminishing marginal rate of substitution between R and T; i.e. if we trade joint supply for joint demand. The division of the T/R total among personnel and therefore each professor's T/R mix is indeterminate, except by administrative fiat. This extreme assumption is implicit in my allocation of faculty costs.

III. Wage Rates for R and T

Assuming that the joint supply problem has been solved, as outlined above, how should we allocate faculty costs among different outputs? Specifically, are R and T remunerated at the same hourly wage so that costs of diversified personnel may be allocated according to time spent on each activity? If neither activity possesses a non-pecuniary advantage, clearly the equilibrium wage rates for teaching and research time will be equal ($W_T = W_R$) and independent of the individual's T/R mix. An optimizing institution will choose a product mix such that the utility it derives from the marginal hours in R and T are equal as well. This provides us with our rationale for allocating total faculty expenditures according to proportions of time spent on R and T.

Alternatively, R may constitute a form of (transferable) training, which will raise the professor's expected future earnings--and this is part of his reward for R. He would then prefer R to T, ceteris paribus, so in equilibrium $W_R < W_T$ and the institutional utility derived from the marginal hour of R would be less than that from T. Then, the monetary cost to the University of R and T would not be proportional to the time spent on each, although the marginal social cost, including the individual's investment in himself by doing R, would be the same for both activities.[7]

Where R implies training, some professors will receive a current remuneration which includes a return on previous R. If this takes the form of a new output, e.g. prestige or advertising, we can no longer attribute full faculty salaries to current R and T; e.g. $S = \overset{D}{B} + P_T T + P_R R$ where $\overset{D}{B}$ represents the value to the University of the professor's past stock of research, and P_T and P_R are the prices per unit of T and R, respectively. In particular, (newly-hired) senior faculty are likely to be paid more than the marginal value of their current R and T for this reason. Since I have no empirical test of the size or existence of these various effects, I have abstracted from them in my study. I assume that wages represent R and T services and opportunities foregone and that time and cost allocations are proportional. Experiments I am currently conducting with multiple regression analysis of faculty in which total remuneration is a function of R, T and A outputs rather than time inputs, may eventually enable me to modify and refine my approach.

IV. Implementation

Taking a professor's real value as equal to his wage and making cost and time allocations proportional is convenient because it sidesteps the need to define a "full-time" faculty member in terms of hours--information which most professors do not have and would not be willing to divulge if they did. What I need, instead, is data on the proportion of time each individual spends on various activities.

This, too, has proved difficult to obtain. Returns from a questionnaire were judged too sparse and non-random to permit use of statistical inference. Therefore, based on the questionnaire and interviews I constructed the following set of assumptions:

1. A typical faculty member spends 20 percent of his time on each course, with a small adjustment for multi-section courses. This builds into our model economies of scale in teaching large classes and ignores quality changes which may occur. Observations on numbers and instructors of courses then enables a statement about proportion of total professorial time devoted to introductory, upper division and graduate teaching in each department.

2. Graduate thesis supervision was measured alternatively at 2 percent and 5 percent per student; the individual variation here may be considerable and the problem of joint supply with research is particularly great. Observations on numbers of advanced graduate students then enabled a statement about proportion of total professorial time devoted to this activity in each department.

3. The use of faculty for administrative purposes--advising students, recruiting, curriculum planning--was taken to be 20 percent for the average member and 50 percent for chairmen and graduate coordinators. This percentage, much of which is an investment in future University activities, is probably higher at Stony Brook than at more stable institutions. My approach, incidentally, assumes economies of scale in departmental administration, abstracts from possible diseconomies, and hence cannot be used to further study the existence of such phenomena.

4. Research was treated--as it often is--as a residual. Since, in many cases, research and thesis supervision are indistinguishable, one being a necessary input into or by-product of the other, it may be more meaningful to treat these two as a single jointly supplied research (R) and research-training (G) activity.

These assumptions yielded two 21 X 4 functional proportion matrices B^S and B^j (one each for senior and junior faculty) in which b_{ik} = the proportion of time spent by senior (junior) professors in department i on activity k. The senior (junior) functional matrix was pre-multiplied by a 21 x 21 diagonal input matrix A^S (or A^j) in which a_{ii} = total remuneration (derived from the budget with adjustments and fringe benefits) paid to senior (junior) faculty in department i. This operation produced a senior and junior faculty allocation matrix for the academic year.

A special problem was posed by the treatment of summer time and remuneration. When the University hires a professor, I would aegue, they are buying his expected productivity in the summer as well as the academic year. Research undertaken during "vacations" and "non-vacations" redound equally to the credit of the University and most faculty members would find it difficult to fulfill their job obligations without working summers. A summer functional proportion matrix was therefore constructed, based on summer teaching responsibilities and assumptions about small inputs of time for administration and preparation of future courses. Research was once again considered a reeidual--much larger during the summer than in the academic year.

The summer functional proportion matrix was then combined with that for the academic year in a 1:4 ratio, the lower weight for the summer reflecting its shorter time span and the fewer average weekly hours spent working for the University during that period. I thus obtained a "full year" functional proportion matrix for the faculty resource.

While the University expects and benefits from activities pursued during the summer, it also pays additional remuneration -- for summer school teachers, departmental chairmen, and research fellows -- and the probability of such compensation may enter into the academic year employment decision of the faculty. Accordingly, a new full year diagonal input matrix was constructed, including these outlays. Pre-multiplying the full year functional matrix by the full year input matrix gives us the full year allocation matrix for senior and junior faculty.

Many faculty members receive income from sources other than S.U.N.Y. -- from teaching at other Universities, consulting with private companies, or doing research under government or foundation grants. These are the "academic entrepreneurs" of the profession. The first two sources were completely excluded from my study for both conceptual and practical reasons. When working for another institution the professor is no longer a Stony Brook resource and it is his performance in the latter capacity with which I am interested. Besides, data was almost totally unavailable.

The third source of outside income is included in this study. My reasoning here is that such grants are not competitive with Stony Brook functions; indeed, they enable the individual to better perform his research activities and therefore should be added to the research resources. Data on grant recipients and amounts is available through the S.U.N.Y. Research Foundation. Thus, my tables on faculty costs are presented separately for "S.U.N.Y." and "S.U.N.Y. plus other" sources of funds.

FOOTNOTES

1. I assume here that the University is acting in an optimal manner to maximize its objective function. Situations where it is not operating on its production possibilities frontier are set forth below. In another paper I discuss the objective or utility function of a non-profit institution. Suffice it to say now that this may, of course, be broader than mere profit-maximization and may contain intangible elements, such as quality--which is particularly difficult to quantify when associated with non-marketed products like public higher education.

2. The present discounted value of his lifetime stream of wage ($\sum_{t=0}^{T} We^{-rt}$) will equal the present discounted value of the value of marginal product time stream ($\sum_{t=0}^{T} VMPe^{-rt}$). Year t=0 is the date of hiring, t=T is the date of retirement, and r is the interest rate. I am abstracting here from complications which may arise in an imperfect capital market when the individual and the institution have different subjective discount rates.

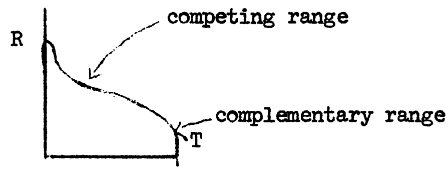
3. See E. James, "A Note on the Social Risk Premium," unpublished manuscript, April 1970.

4. For a fuller discussion of the joint supply problem, see E. James, "Resource Allocation and Costs in Higher Education," Working Paper No. 3, Economics Department, Stony Brook.

5. The validity of this model might be studied empirically by examining a number of institutions with different product mixes and deriving total costs as a function of UG, G, R, A and various interaction terms. However, the difficulty in quantifying outputs seriously limits this approach. Thus, costs may vary across institutions because of their product mix or because we are measuring R incorrectly or because we have failed to account for differences in quality of teaching or because the institutions, also beset by these ambiguities, are producing inefficiently, off their production frontier, and these distortions may be systematically correlated with product mix.

6. The opposite case, increasing returns to specialization, is also conceivable. This would result in a convex-to-the-origin production frontier and efficiency gains from specialization rather than diversification. Research and teaching would then be technically competing rather than complementary with each other. It may be that the professor's actual production frontier is some combination of these two, as, e.g., presented in Figure III.

Figure III



7. Once hired, with a given wage and expected T/R mix, the typical faculty member in this second model will, of course, try to move in the direction of greater R, which implies greater investment in himself. This corresponds to the frequent observation that many professors emphasize R at the expense of T and helps explain the University's imposition of minimum teaching constraints. In order for decentralized decision-making by faculty to coincide with the University's desired T/R mix, the institutional policies with respect to promotion and salary increase must (contrary to current practices?) reflect the higher marginal utility of an hour of T to compensate for the investment component of R.

If, as my second model predicts, $W_R < W_T$, why does it impressionistically appear that researchers are compensated more generously than teachers? One possible reason is that people are paid for their past stock of research as well as their present research (i.e., they are now receiving a return on their past investments in themselves) but since the latter is correlated with the former, an illusion is created about high remuneration for current research. Another explanation may be that researchers work longer hours than teachers and therefore receive higher total wages despite a lower return for the marginal time period. Finally, recall that in a more general model faculty production frontiers are non-linear and exhibit different relative as well as absolute productivities. It may be that, on the average, people with greater absolute productivity also have a comparative advantage in research. Then a lower T/R rate would generally correspond to, but would not be causing, higher compensation for equal hours of service.

Stony Brook Working Papers

No. 1. Edward Van Roy, "On the Theory of Corruption," February 1970

No. 2. Roy Radner and Leonard S. Miller, "Demand and Supply in U.S. Higher Education: A Progress Report," December 1969

No. 3. Estelle James, "Resource Allocation and Costs in Higher Education: A Case Study of SUNY at Stony Brook," November 1969

No. 4. Dieter K. Zschock, "Health Planning in Latin America: Review and Evaluation," February 1970

No. 5. Edward Ames, "Ancient and Modern Development Models," February 1970

No. 6. Peter J. Kalman, "A Global Theory of Consumer Choice With Price Influenced Utility Functions," February 1970

No. 7. Leonard S. Miller, "Predicting Family Income in the SCOPE Sample," April 1970

No. 8. Richard Dusansky and Lawrence Nordell, "Rising Tax Rates and the Demand for Public Services: An Analytical Approach," June 1970

No. 9. Edward Ames, "A Short-Cut Procedure for Inverting Sets of Symbolic Matrices Having Columns in Common," May 1970

No. 10. Michael D. Intriligator and Peter J. Kalman, "Generalized Comparative Statics with Applications to Consumer Theory and Producer Theory," May 1970

No. 11. Michael Zweig, "Bourgeois and Radical Paradigms in Economics," June 1970

No. 12. R. L. Basmann, Franklin Lee Brown, William S. Dawes, and Gregory K. Schoepfle, "A Note on the Exact Finite Sample Density Functions of GCL Estimators of Structural Coefficients in a Leading Exactly Identifiable Case," June 1970

No. 13. R. L. Basmann and Gregory K. Schoepfle, "The Exact Finite Sample Density Functions of GCL Estimators of Structural Coefficients in a Leading Exactly Identifiable Case: An Alternative Derivation," August 1970

No. 14. Edward Ames, "A Class of Linear Dynamic Macroeconomic Models Involving Prices," August 1970

No. 15. Peter J. Kalman, "Applications of a Theorem by Scarf on Cooperative Solutions to N-Person Games to Problems of Disarmament," August 1970

No. 16. Michael Zweig, "Black Capitalism and the Ownership of Property in Harlem," August 1970

No. 17. Peter J. Kalman, "On the Assumption of Continuous Divisibility in Economics, I," August 1970

Stony Brook Working Paper Series

No. 18 Peter J. Kalman, "A Stochastic Constrained Optimal Replacement Model," September 1970.

No. 19 Richard Dusansky and Lawrence P. Nordell, "The Financial Crisis of the Cities and the Macroeconomics of Unbalanced Growth Revisited," October 1970.

No. 20 Estelle James, "Some Notes on the Faculty Resource at a University," December 1970.

No. 21 Richard Dusansky and Lawrence P. Nordell, "The Public Service Elasticity of the Property Tax Base in a Growth Context," November 1970.

No. 22 E. James and L. Nordell, "Investment in Changing Preferences," November, 1970.

No. 23 E. Neuberger, "The Yugoslav Visible Hand System: Why Is It No More?" December, 1970.

No. 24 E. Neuberger, "Eastern European Economics - A Review Essay,"

No. 25 R. Dusansky and P.J. Kalman, "Externality, Welfare, and the Feasibility of Corrective Taxes," November 1970.