

AGENCY FOR INTERNATIONAL DEVELOPMENT
WASHINGTON, D. C. 20523
BIBLIOGRAPHIC INPUT SHEET

FOR AID USE ONLY

Batch 48

1. SUBJECT
CLASSI-
FICATION

A. PRIMARY

B. SECONDARY

TEMPORARY

2. TITLE AND SUBTITLE

Problems of strategy in developing countries with exhaustible comparative
advantage

3. AUTHOR(S)

Hollister, R.G.

4. DOCUMENT DATE

1970

5. NUMBER OF PAGES

19p.

6. ARC NUMBER

ARC

7. REFERENCE ORGANIZATION NAME AND ADDRESS

Williams

8. SUPPLEMENTARY NOTES (*Sponsoring Organization, Publishers, Availability*)

(In Center for Development Economics. Research memorandum no.39)

9. ABSTRACT

(ECONOMICS R & D)

10. CONTROL NUMBER

PN-AAC-989

11. PRICE OF DOCUMENT

12. DESCRIPTORS

13. PROJECT NUMBER

14. CONTRACT NUMBER

15. TYPE OF DOCUMENT
GSD-2475-RC2

CSD-2475 Res
PN-AAC-989
Williams

PROBLEMS OF STRATEGY IN DEVELOPING COUNTRIES
WITH EXHAUSTIBLE COMPARATIVE ADVANTAGE

by

Robinson G. Hollister, Jr.

Research Memorandum No. 37

Center for Development Economics
Williams College
Williamstown, Massachusetts 01267

November 1970

Problems of Strategy In Developing Countries
with Exhaustible Comparative Advantage

by

Robinson G. Hollister, Jr.*

In recent years much of the economic development literature has been focused on situations in which a country's development problems center, in one fashion or another, on the "foreign exchange constraint"; gap models, import substitution, effective rates of protection, and the like, have dominated in the literature. There are a number of economies for which the foreign exchange constraint is--or for some historical period was--not the effective constraint on growth. The question of the alternative economic strategies for such economies has received relatively little attention lately and I would like to examine here some issues which might be considered in evaluating strategies for such economies.¹

After specifying the types of economies I would include in the category of "exhaustible comparative advantage" and reviewing the prescriptions for such countries which might flow from traditional development theories, I will argue that such economies may have to behave in ways very similar to foreign-exchange-constrained-economies to the extent that they too must be concerned with the dynamics of comparative advantage. I will argue, in particular, that the "exhaustible comparative advantage" must be viewed as a stock of wealth and that the strategic problems of these economies are to transform

* Gordon Winston did his best to show me how to improve this essay. I wish both to thank him and absolve him of responsibility for it.

that stock of wealth into a set of long term productive assets. Failure to develop a strategy in this light may leave these countries in the longer term with their initial comparative advantage exhausted and a weak economic structure, inappropriate for long-term growth. The paper concludes with a discussion of some issues concerning the dynamics of comparative advantage, with particular consideration of the role of the distribution of income.

I. "Exhaustible Comparative Advantage"

There are several types of situations in which the issues discussed in the rest of this paper might be relevant, and it may help to cite specific country examples in order to give some concreteness to what will be otherwise a rather abstract discussion. The sort of economy I have most directly in mind as being unconstrained by foreign exchange problems and requiring some unique policy consideration is that of countries with a particularly strong mineral resource base which provides them with a sizeable export sector. Venezuela, Iran, Libya, Nigeria, Zambia, Gabon clearly fall in this category. There are others which have such a strong mineral resource base and could be considered in this category but which may not, for a variety of reasons completely escape the foreign exchange constraint, e.g., Liberia, Guinea, Jamaica. There is, as far as I am aware, little discussion in the literature of the structure of the economy and policy alternatives which are peculiar to these economies with a strong mineral-based comparative advantage.² A second situation in which the following discussion would be relevant is that of a large, limited-time-period, transfer of financial resources made available to an economy, relieving the foreign exchange constraint for a period of time. Israel certainly fell into this class in the past and such a situation might arise with respect to certain regional economies, e.g., East Pakistan, Northeast Brazil, should large resource transfers be made available to them for reasons of regional balance.³

The common feature in these situations is the existence of clear primary comparative advantage in an activity which it is useful to conceive of as an "exhaustible" comparative advantage. The problem to be faced in these economies is how to transform an "exhaustible" comparative advantage into a long term comparative advantage based on a more broadly structured economy. The "exhaustible" comparative advantage may be thought of as a particular stock of wealth (its major value does not arise from production activity) and the problem as that of transforming that wealth into a set of long term productive assets. The basic question is: what difference does it make how the gains from an "exhaustible" comparative advantage are distributed? How will the long term structure of the economy (when the stock of wealth has been depleted) be affected by the particular mechanisms which determine the distribution of these gains in the interim period?

II. Traditional Prescriptions

Faced with situations in which, because of the strong comparative advantage base, the foreign exchange constraint is inoperative, it would seem natural to revert to the earlier growth and development literature to examine the policy prescriptions suggested before the emergence of the "exchange gap" concern. I do not wish to attempt a thorough review of that literature, but would like to sketch--or to put it more frankly, caricature--it in order to provide the base for the next point of discussion.

The policy suggestion derived from neo-classical theories would be simply to allow the market to determine the allocation of resources, including the allocation of the gains from the "exhaustible comparative advantage." The transformation of the comparative advantage would in the long term be determined by the traditional free trade solution.

The response derived from Keynesian theories (as represented by various Harrod-Domar type formulations) would recognize, perhaps, at least some structural problem and might advocate raising the aggregate savings rate through public savings of some of the gains from the "exhaustible comparative advantage." Once again, however, the allocation of resources would be presumed to be largely market determined.

A variant of these Keynesian views is one which recognizes somewhat more extensive structural problems and would lead to a policy of public investment of the "exhaustible" gains in "social overhead capital" and other "non-tradables" on the grounds that the purely market solution might lead to less than the socially optimal investment in these activities. Even in this case, however, the allocation of resources outside of these sectors would be left to the market-free-trade solution.

The basic point is that all of these prescriptions place heavy reliance on the market-free-trade solution for the allocation of resources, including the gains from the "exhaustible comparative advantage." There are several assumptions inherent in the market-free-trade approaches which should be highlighted (and these are points which have been made by many commentators in the past). These approaches are based upon a static, or comparative static (or in the more recent literature, equilibrium time path) model of the economic process and largely ignore the question of the extent to which the current structure of the economy is likely to influence the character of comparative advantage over the longer term. Undoubtedly, this is largely because the market-free-trade approach assumes a great deal of "flexibility" in the economy—a relatively painless and rapid reallocation of resources made in response to changes in the forces which determine the comparative advantage for that economy. The assumption is made that there is very little "inertness" in the long term structure of comparative advantage.

It is often forgotten that in the strictest theoretical sense, the neo-classical market model takes as given both the state of technology and the distribution of income. The allocation of resources resulting from the market-free-trade operation is efficient only with respect to the existing state of technology (or more strictly, present technology and expectations concerning future technology on the part of individual investors) and the given prior distribution of income. The extent to which changes in technology might affect the structure of comparative advantage for the economy and, therefore, have implications for the current allocation of resources is not directly addressed in the market-free-trade approach. Whether a different current distribution of income might significantly affect both the current allocation of resources and the structure of future comparative advantage is, in general, not considered. Some neo-classical and Keynesian models did include explicit consideration of the effect of the distribution of income on the aggregate savings rate, but this was the limit of the consideration of the role of distribution (about which I will have more to say below).

Some of the more modern development literature has raised questions about a few of these market-free-trade assumptions and has provided prescriptions which move somewhat beyond the market-free-trade prescriptions. I refer primarily to the literature on planning. The underlying theoretical argument for planning has been that, with no clearly developed futures markets in all goods, investment decisions are likely to be inefficient because of inadequate coordination of inter-related investment decisions. Thus, in this literature, emphasis is put upon the development of the planning mechanism to provide the basis for co-ordinated investment and on the development of more conscious social investment criteria, making proper allowance for externalities and distortions in the market

structure. This approach would seem to deal somewhat more directly with the "flexibility" by trying to structure current investment decisions in terms of the expected structure of future demands. In theory, it would seem also possible in this framework to deal more explicitly with the problems of changing technology. In practice, however, as John Sheahan has pointed out with respect to Colombia (RMB3), the planning procedures which emerged from the ideas expressed in the literature were largely a matter of estimating the structure of final demand by calculation of income elasticities of demand and then application of input-output coefficients in order to project input requirements. While changes in technology and resultant changes in comparative costs were often alluded to, no consistent methods were developed for dealing with the effects of such changes on the long term structure of comparative advantage.

When the problems of how to transform an "exhaustible comparative advantage" into a long term comparative advantage based on a more broadly structured economy is posed, the traditional prescriptions just reviewed seem to me to have certain weaknesses.

First, the market-free-trade approach seems to assume away the problem; the gains from the "exhaustible comparative advantage" are treated like any other resource flow within the market framework. There is no distinction made between flows from reproducible assets and flows which result from the depletion of a non-reproducible asset. By assuming "flexibility" and ignoring long term influences in terms of technological change and the distribution of income, this approach leads to the conclusion that there is no need to develop special policies to deal with the utilization of the gains from "exhaustible comparative advantage."

Second, the more modern planning approach seems also to ignore the distribution question and to have dealt inadequately with the problem of technological change. In dealing essentially with the standard demand, input-output

relationships, it has dealt only in a partial way with the dynamics of comparative advantage. Therefore, given the traditional prescriptions, we are still left with some fundamental questions about the role of technological change and that of distribution of income in determining the long term structure of comparative advantage, and these questions would seem to be of basic importance in developing reasonable policies for transforming the gains from "exhaustible comparative advantage."

III. Some Issues With Respect to the Dynamics of Comparative Advantage

The review of traditional theoretical prescriptions led to a focus on what seem to me weaknesses in terms of the question of technological change and the distribution of income and their roles in the dynamics of comparative advantage. I want to take up each of these issues in turn and then in a next section discuss some of the ways in which they might interact.

a. The role of technological change--Henry Bruton and John Sheahan have most clearly brought to the fore the importance of attempting to take into account the role of technological change (productivity growth) in the determination of long term comparative advantage (RM 13,32,33). The basic point is that changes in comparative costs over time are of central importance to the determination of which economic activities will be the ones in which a given economy has comparative advantage in future years. If an adequate projection of comparative costs, as well as demand, could be made, substantial progress would have been achieved in solving the problems of predicting the dynamics of comparative advantage.

I would like to add just a few comments to the discussion by Bruton and Sheahan. Sheahan, basing his arguments on the Colombian data, points out a number of difficulties in attempting to use past productivity change as a guide to expected future change.

It seems to me that these difficulties are strongly underscored by studies of more advanced economies. Hendrick's work on productivity change in the U.S.⁴ showed that there was extreme period to period variation in rates of productivity gains for various industries (whether measured as total factor productivity or man-hour productivity) and his attempts to explain relative productivity gains in terms of differences in industry structure, financial strength and engineering and scientific personnel failed. Kerlove's review of industry production function studies⁵ shows that sophisticated estimates of production functions in various U.S. industries come up with widely varying estimates of parameters, including quite different estimates of the rate and character of technological change in individual industries (often, even when analysts were using the same basic data). The estimates of parameters of production functions were not at all "robust." These studies must certainly heighten one's doubts about the extent to which, using current methodology, predictions of individual industry productivity change can be improved to the point that they would be acceptable as a good guide to future comparative advantage.

Sheahan also mentions considerations which come close to the basic question, raised above, of how current patterns of activity influence future comparative advantage. He notes that productivity growth may be partly exogenous and partly induced by the pattern of current investment. This same viewpoint is arrived at by those who stress the role of "learning-by-doing" in the growth of productivity.

These two issues concerning technological change present some very serious problems for economies with "exhaustible comparative advantage" (just as they do for currently exchange-constrained-economies). On the one hand, if the structure of current investment does affect future productivity growth, then it is not a matter of indifference how the gains from the "exhaustible comparative advantage" are currently distributed. (It may well be that the "exhaustible comparative advantage" economies are even more sensitive to this issue because

they lack the discipline of the exchange constraint which tends to bring the issue more directly to the forefront). On the other hand, inability to predict productivity change in individual industries leaves us with little guidance about how to shape our concerns about the current structure of the economy.

Since the further implications of these issues are related to the interaction with the issues concerning distribution, I would like to set them aside for a moment while I discuss the distribution issues and then return to the interaction of the two sets of issues in the next section.

b. The role of income distribution--As noted above, there has been relatively little discussion of the role of income distribution in economic growth and development, with the exception of its effect on the level of aggregate savings. A fundamental point which has been ignored is that there are really two sides to the question of the role of income distribution. Traditionally the discussion of distribution has been limited to consideration of who receives income and the related question of how they spend it. But an equally important question may be how income is received, that is, is the income received through employment, transfer payments or return on private property? I will discuss the relevance of the more traditional distribution questions of who receives income first and then take up this important point about how the income is received.

With respect to the question of who receives income and how they spend it there are two general issues. First, there are questions related to the level of saving. Will a more equal distribution of income have an effect on the the level of aggregate saving? Certainly the work of Modigliani and Ando on the consumption function must make us hesitate about drawing any quick conclusion that a change in the distribution of income will have any long run effects on the aggregate level of savings. One should not generalize from their estimates for the U.S. to the situation of developing countries, but

one should at least be warned that sophisticated models are necessary to make reliable estimates for developing countries. Another question related to savings derives from the imperfections in capital markets in developing countries. Would alterations in the distribution of income cause savings to flow through different investment channels and thereby have an effect on the pattern of availability of loanable funds for different types of activities? Papanek argues rather strongly that the flow of profits to particular sets of individuals had a substantial effect on the investment pattern of Pakistan.⁶ The allocation of the gains from "exhaustible comparative advantage" may affect not only the overall level of savings but the development or lack of development of financial intermediaries which will have long term influences on the pattern of future investments. With respect to the consumption effects of alterations in the distribution of income, there is the question of the effects on the composition of demand. This sort of question has been raised in a general form by those who have pointed to the dangers of the development of "enclave economics." These effects on the composition of consumption will, of course, be reflected in the long run composition of imports. In terms of both savings and consumption effects on the pattern of investment and, thereby, the long term structure of the economy, it would seem that the role of income distribution in how the "wealth surplus" from the "exhaustible comparative advantage" is utilized could be important.

In general, a major determinant of the distribution of income is the extent and character of employment. It is therefore necessary to bear in mind the importance of how income is received as well as how it is spent. The distribution of income is of interest not only because it determines the distribution of purchasing power but also because it is a reflection of pattern of employment experience. This employment experience could, in turn, have significant effects on the long term structure of comparative advantage. It has been pointed out

by Baldwin⁷ that the character of the production function in primary products export sectors can influence significantly long term comparative advantage. Baldwin contrasts "plantation type" exports with "mineral type" exports. The former provides a wider base of employment but at low wages and with very little skill development. The latter provides more skill development at higher wages but for a very narrow segment of the potential labor force. The "plantation type" provides a broader expenditure base, but very few externalities in the form of skill transfers for the development of secondary industries. The "mineral type" provides for skill transfers, but on a very narrow base and likewise has narrow, though high-wage-level, expenditure base, providing little encouragement for secondary industry development.

Baldwin's suggestion that the current character of employment and the related distribution of income can have an important effect on the long term structure of comparative advantage is reinforced by the recent literature on "learning-by-doing" and by even more recent work on the determinants of comparative advantage for the U.S. This work builds on the initial observation by Leontief (A.E.R., June 1964) that industry by industry there is little variation in capital-output ratios in international cross-section, but considerably greater variation in labor-output ratios. This observation has been underscored by Baldwin's recent finding that there is virtually no net capital flow embodied in U.S. trade--capital inputs in exports are equal to capital inputs in imports. The implication of this finding is that labor factors play a large role in the determination of comparative advantage. This implication has been substantiated in several empirical studies,⁸ in which it has been shown that the relative abundance of skill in the labor force plays an important role in determining U.S. exports. It seems evident that, to the extent that capital is relatively mobile internationally, comparative advantage in the long run is likely to be determined by the natural resource base and by the extent and character

Though the focus of my discussion must necessarily be on economic factors, it seems important to note that the distribution of income, both in terms of how it is received and how it is spent, is likely to influence the development of a whole set of social and political institutions. The "exhaustible comparative advantage" economies are not only particularly prone to "enclave" development, fostered by a large expatriate community, but also to the development of a class structure through the private or public control over the gains from the "exhaustible comparative advantage." The social and political institutions fostered by the current distribution of income are certain to have long term effects back upon the structure of the economy, playing a role in determining the directions in which it is "permissible" for the comparative advantage of the economy to develop.

IV. Policy Considerations in "Exhaustible Comparative Advantage Economies."

Having developed several themes at length, I would like now to try to pull them together, to point up some of the interactions among these issues--which may be rather obvious to the reader already.

I have been discussing issues which concern economies which have (or have had) some natural comparative advantage which frees them for some period of time from the foreign exchange constraint, but which face potential difficulties because their comparative advantage is of an "exhaustible" nature. This "exhaustible comparative advantage" should be regarded as a stock of wealth which will be depleted over time, and the problem of these economies is to formulate a strategy which will insure that this stock of wealth is transformed over time into a set of long term productive assets. The first question which arises is why an explicit strategy is required; what dangers are there in simply adopting the neo-classical market-free-trade solution? The answer to this question

turns primarily on the role of the distribution of income--an element which the neo-classical analysis largely ignores--both in terms of how that income is received and in terms of how it is spent. At the simplest level, there is the danger that the gains from the "exhaustible comparative advantage" will be distributed in such a way that they will be for the most part "consumed" rather than being transformed into long term productive assets. This danger has been pointed out to some degree in the more traditional literature which stressed the propensity to "enclave" development in situations where a primary products export sector dominated the economy. More deeply, it must be considered that the pattern of current economic activity may have important effects on the pattern of long term comparative advantage for the economy through its effects on the level and direction of technological change, the extent and character of labor force experience, the degree of "flexibility" in the economy. To the extent that these current patterns are important in affecting long term comparative advantage, economies with "exhaustible comparative advantage," even though not currently constrained by foreign exchange availability, must concern themselves with the dynamics of comparative advantage.

Explicit consideration of these problems leads to the rather surprising possibility that policies in these economies may in many cases look quite similar to those of economies currently suffering from an exchange constraint (assuming, of course that the exchange-constrained-economies are following policies which serve to improve their long term comparative advantage). Arguments for "infant industry" protection may arise, even though the economy is not faced with current exchange shortages. For example, during the Nigerian civil war import licensing and higher tariff barriers were developed in order to preserve foreign exchange for arms purchases. Considerable import substitution industrial growth occurred as a result. Postwar, with sizeable oil revenues in the offing, many have concluded that import restrictions should be removed since exchange limitations are no longer an important consideration.

parative advantage might however, lead to the conclusion that the removal of import restrictions is not the best policy. I present this example not as an explicit conclusion for this case, but as an example of the sort of policy outcome which must at least be considered a possible result of the concern with the role of current distribution in the "exhaustible comparative advantage" case.

If such economies must be concerned with the dynamics of comparative advantage they face problems similar to those of exchange-constrained-economies in predicting change in comparative advantage. As pointed out above, a central problem in making such predictions arises because past evidence would seem to suggest that it is very difficult to predict the relative rates of technological change in different industries. There are no simple answers to this very difficult problem. There is one approach which I think might be worth further consideration and investigation in the "exhaustible comparative advantage" case. As noted above, there is some recent evidence that the nature of experience in the labor force plays a key role in the determination of comparative advantage. This suggests that for public policy purposes it may be possible to by-pass the problem of predicting industry-specific technological change and to focus on policies which will operate on long term comparative advantage at a more fundamental level. For example, if broadening the base of labor force experience were important for long term comparative advantage, policies could be formulated to give maximum encouragement to those industries which have been found, internationally, to have the highest labor-output ratios--or those which have the highest variance in labor coefficients--combined with policies to encourage labor-intensive methods. Thus the criteria for policy might be shifted from the industry level to the level of more fundamental factors. (Note again, this is an example. There may be fundamental factors other than labor force experience which influence comparative advantage which could be promoted by public policy. The point here is to consider moving away from the practice of basing policies on criteria such as

technological change at the industry level--which have proven very difficult to make operational and reliable). Countries not currently subject to the foreign exchange constraint may be in a better position to pursue such policies and the investment criteria may not be so much to maximize GNP in the short run as to maximize employment (or some similar factor which will be most likely to convert their stock of wealth into long term productive assets).⁹

It is important, above all, to consider the role of governmental policy in these "exhaustible comparative advantage" situations. I feel compelled to state again the oft-made observation that governmental policy cannot in any sense be neutral in this situation. The governmental institutions as they exist define the "rules of the game." When the current distribution of income and related distribution of economic activities is accepted, then, as argued above, this will have long term implications about how the stock of wealth inherent in the "exhaustible comparative advantage" is utilized. The consideration of the role of governmental policy instruments is unavoidable.

Governmental policies can have both direct and indirect effects on the distribution of the gains. The direct effects are those usually considered with respect to income distribution and government taxation as well as those sometimes considered in terms of the distributional effects of direct government expenditures. For example Venezuela seems at first to have affected the distribution of gains from oil by reducing taxation to a minimum and investing directly in "social overhead." Later, however, a switch was made to more direct investment in industrial activity. Pursuit of these two different policy configurations surely would have different sorts of effects on income distribution, the pattern of employment and the structure of the economy.

Equally important, however, may be the indirect, often unintended, effects of government policies on the distribution of income. To cite just two examples: a) In many of the developing economies the public sector is the major employer and its wage-setting policies dominate the labor market. Many have argued that high governmental salary structures have dictated increased inequality in the distribution of income through effects on economy-wide wages and employment.

b) Bureaucratic licensing arrangements can have effects on the distribution of income through their important effects on access to scarce economic resources and opportunities (as well as effects on allocation and utilization of resources, See G. Winston "Corruption and Industrial Growth under Artificial Exchange Rates" RM-39.)

This summary of policy considerations has been rather heavy on generalizations and quite thin with respect to specific policy guidance. That is an accurate reflection, however, of my assessment of our state of knowledge. It might be helpful, in any case, to close by trying to specify some of the needs for empirical studies which seem to emerge from this discussion of issues:

a. There is a basic need to attempt to determine how sensitive the development of comparative advantage is to the distribution of income--in both the receiving and spending sense. Some empirical review of the impact of policies on distribution and the resultant influence on economic structure in countries with "exhaustible comparative advantage," such as Venezuela and Iran, could yield important insights.

b. Some empirical estimates of consumption functions, using the more sophisticated methods of neo-classical consumption function formulations, might yield useful insights concerning likely savings effects of changes in distribution. (Some first steps in this direction are made by William Cline "The Potential Effect of Income Redistribution on Economic Growth in Six Latin

American Countries" Disc. Paper 13 Woodrow Wilson School Research Program in Economic Development.)

c. Can any relationships be established between the distribution of income, financial institutions and the flow of savings into particular types of investment?

d. The sensitivity of expenditure patterns to differences in the distribution of income could be explored. (Gline op. cit. undertakes this task also).

e. What are the means and variances, as determined from international cross sections, of the labor-output and labor-capital ratios for various industries? Can external benefits in terms of labor force training or other characteristics be associated with particular types of industries?

FOOTNOTES

¹As will become apparent later in the paper, it also happens that this is a convenient way to approach a more general discussion of the "employment problem" and I intend in later papers to address that problem more directly.

²D. Seers, "The Mechanism of an Open Petroleum Economy," Social and Economic Studies is the only general piece I have found and his prescriptive, as opposed to descriptive, discussion is rather limited.

³Some of the discussion might also apply where a strong non-mineral primary products comparative advantage exists which relieves exchange constraints for a period of time but is threatened by technology and obsolescence or limited expansibility, e.g. Malaysian rubber, Peruvian fishing.

⁴Productivity Trends in the United States, NBER 1961.

⁵"Recent Empirical Studies of the CES and Related Production Functions" in M. Brown (ed.), The Theory and Empirical Analysis of Production.

⁶See Pakistan's Development, p. 178, 207.

⁷"Export Technology and Development from a Subsistence Level" Economic Journal, March 1963.

⁸D. Kessing, "Labor Skills and the Structure of Trade" in Kennen and Lawrence (eds.), The Open Economy; A. Somersan "Skill Endowments and International Trade" Wisconsin Ph. D. Thesis; J. Wilson "Trade and Factor Growth" Wisconsin Ph. D. Thesis.

⁹In any case, given the tremendous uncertainties surrounding prediction of technological change it would seem wise to attempt to apply the methods of portfolio balance, i.e., to take into account both expected performance of industries and the variance and covariance of likely outcomes for industries, and, perhaps to sacrifice some possible gains from economies of scale for the protection afforded by greater diversification.

¹⁰I intend to further discuss specific policy instruments for affecting distribution and employment in subsequent papers.