The Comparison of Kibbutz Productivity to National Statistics: Analysis and Remarks*

by

Ehud Satt

Ruppin Institute, Emek Hefer, Israel

Abstract

This study examines conceptual problems in measuring product and dis-posable income of the kibbutz and in comparing them with the relevant national data. The inquiry was prompted by Kroll and Polovin's paper in this Journal (1997), in which the authors found that per capita product and disposable income of the kibbutz are significantly lower than the national average in Israel. To carry out the analysis, we develop a formal-conceptual model of a national economy which consists of several sectors. Using this model it is shown that the "terms of trade" between the sectors – and the income transfers involved – have a marked effect on the per capita income in each sector, independent of its own productivity. In particular, two downward accounting biases may account for the results of Kroll and Polovin, regarding the kibbutz economy: the "interest effect" and the "tax effect". We hope that this analysis will contribute to a better understanding of this issue, and also – more generally – to the national accounting theory.

Key Words: *National income and accounting; interest payments and debt financing; income tax; kibbutz.*

Introduction

In their article in this Journal (Vol. 25/1, 1997), Yoram Kroll and Avraham Polovin made an interesting attempt to measure the value of product and disposable income (and thereby consumption and saving) in the kibbutz economy, and to compare them with the national statistics in Israel. Their results may be interpreted as showing a basic weakness and inherent inefficiency in the kibbutz economy.

Thus, for example, the authors found that as early as 1982, when the kibbutz

---

Editors note: this article, like the one by Kroll and Polovin (1977) to which it refers, deals with the kibbutz economy that recently underwent a deep crisis accompanied by major changes.

economy appeared to be relatively healthy and robust, and before the deep economic crisis of the mid-1980s, per capita product of the kibbutz sector was only 85 percent of the national average. In 1989, in the midst of the crisis, per capita product in the kibbutz economy had declined to only 65 percent of the national average (Kroll and Polovin, 1997:25).

Their article is important from a practical as well as conceptual aspect. At the *conceptual level* it was the first attempt to implement empirically the theoretical basis of using national accounting tools to analyze the kibbutz economy, developed previously (see below). On the *practical side*, the results of the measurements carried out were adopted and put into use by the kibbutz movements, as well as by related institutions and supervisory authorities such as the Arrangement Administration (responsible for the kibbutz debt restructuring arrangement intended to lead to the economic recovery of the kibbutz movements). This emphasizes the importance of examining the consistency and applicability of the methods and results in Kroll and Polovin's article.

The current study focuses on the conceptual problems of the measurement.[1] No doubt, the kibbutz economy is currently suffering from a severe crisis which has implications for its very survival, but to analyze it thoroughly one must differentiate between *cause* and *effect*. In other words, it may be that it was not the inherent inefficiency of the kibbutz economy that caused the crisis, but vice versa – that the external crisis, essentially of a financial nature, and the sharp shock it inflicted on the kibbutz, may have brought about what appears to be inefficiency.[2]

For this analysis, we develop a formal-conceptual model of a national economy that consists of several interrelated sectors that trade between them. It will be shown that without reference to the economic efficiency of each sector, it is the "terms of trade" between the sectors that affect and determine what may be interpreted as efficiency or inefficiency of each sector. We will claim, accordingly, that a significant part of the results obtained by Kroll and Polovin (1997) may be explained by internal bias in the way of comparison they used, and not by the structure and economic situation of the kibbutz economy itself.

The overall theoretical conclusion drawn in this current study is that great caution must be exercised in making comparisons of economic efficiency of sectors which have different characteristics and functions – for example the manufacturing (productive) sector, or the kibbutz economy – with that of the total national economy. A parallel could be drawn, for example, with a comparison of the strength (efficiency)

---

[1]   It examines the theoretical and conceptual aspects of comparing product and disposable income. It does not address the practical, empirical problems of gathering and processing the raw data. Nor does it relate to the consumption and saving variables discussed by Kroll and Polovin. These should be examined separately, and we may revert to them in a future article.

[2]   Even if this is the case, the question can be asked: what made the kibbutz economy so vulnerable to the crisis? However, the answers to this question may relate less to the real economic variables discussed by Kroll and Polovin, and more to financial aspects such as capital structure (in particular, the level of equity vis-à-vis debt) and the financial management of the kibbutzim.

of a human hand or the head with that of the whole body – which has a doubtful meaning.

The use of the national income approach to analyze the kibbutz economy started with Haim Barkai. In an earlier study (1971), Barkai had formulated the income of the kibbutz economy in terms of value-added, *i.e.*, the difference between receipts from sales on the one hand, and payments to external factors of production (which do not include the labor and land provided by the kibbutz itself) on the other. Barkai repeats this formulation more formally thereafter in his definition of the economic "objective function" of the kibbutz (Barkai, 1977:269, Appendix B).

A more explicit theoretical discussion of the use of the national accounts approach to the kibbutz economy (as opposed to the business-comercial approach) was first introduced, to the best of our knowledge, by the current author (Satt, 1974); there analyzed, *inter alia*, the philosophy and history of national income accounts, and formulated the overall conceptual framework appropriate to the kibbutz. That article constructs kibbutz accounts so that they include the values of income (product),[3] consumption, savings and investment (and the "capital formation" account), as well as resources and uses, and debt. The article also examined quantitative methods of using the accounts (including linear programming to reflect "shadow prices" for internal activities). In addition, in that article Satt offers the possibility of extending the definition of income (product base), in line with modern economic theory, by including the value of household services and the (alternative) value of leisure.

At the beginning of the 1980s the professional literature carried a broad discussion on the subject of using national income terms to analyze the kibbutz economy. The contributors to the debate, which took place mainly in the *Economic Quarterly* in Israel, were Cohen (1982), Peleg (1982, 1984), and the current author (Satt, 1983, 1984). An interesting experiment was also carried out at that time to analyze the moshav (smallholders' cooperative settlements) economy using national accounting tools (Zusman and Gal, 1984).

The structure of the current paper is as follows: the next section deals with the general background to the measurement of national income; essentially, it addresses the *efficiency criterion* vis-à-vis the *welfare criterion*. Accordingly, the conventional narrow approach to national accounts will be compared with the more modern – extended approach. The following sections will deal with the main problems encountered in Kroll and Polovin's 1997 study, with the third section addressing the "interest effect", and the fourth section – the "tax effect".

These sections discuss the central question of this study: for the purpose of assessing efficiency, can the results relating to any one specific sector be compared with those of the economy as a whole, and what conclusions can be drawn? For this purpose a formal-conceptual model is developed herein as well as an illustrative example relating to a multi-sector economy. For simplicity and a better readability, the numerical example is given in the text itself wherein the complete formal model is

---

[3] For simplicity the current study uses the terms: product, income, and value-added – interchangeably.

relegated to the appendices. However, there is a *full consistency* between them, and the reader who is familiar with theoretical models is advised to consult the formal model at the relevant times and section. Finally, the last section summarizes the article.

The objectives of income measurement: A general background

The productivity of the kibbutz economy

Kroll and Polovin (1997:30) conclude that "Throughout the crisis period, and even before, the economic performance of the kibbutz appears to be poor, relative to that of the other sectors of the Israeli economy".

Certainly, the inherent problem of the efficiency of the kibbutz economy must not be taken lightly. This issue is not a new one, and has been hanging over the kibbutz since its establishment some ninety years ago. It is important to bear in mind that for ideological reasons kibbutzim opted to run a complex economy based on agriculture, industry and services in a democratic and egalitarian manner. Thus there may well be an *economic price* for the *ideological principles*. Nevertheless, Kroll and Polovin's findings contradict in some way the results of earlier studies.

Barkai summarizes the findings of his comprehensive study on the kibbutz in the following words:

> The wealth of data we gathered enabled us to describe the growth of the kibbutz movement over six decades in quantitative terms: the population growth from a few dozen to over 100,000 members, and the concomitant growth in productive capacity and its achievements in the areas of production and income distribution… This research shows that the kibbutz as a collective *achieved performance levels no worse, to say the least, than comparable firms* operating according to the normal market rules.

This leads him to the conclusion that:

> These findings refute the claim raised in the intense debate on the subject in the 1920s that *the kibbutz is essentially not viable*, since it rejects the use of material incentives, and severs the connection between individuals' (personal) contribution to production and their real income.
>   (Both quotes are from Barkai, 1980: introduction; emphases are mine, E. S.)

Note that Barkai avoided a comparison of like with unlike. He compares the kibbutz with comparable firms. His data extend only up to a little after 1970; the question may therefore be asked: did this positive trend change in the 1970s, and particularly in the 1980s and 1990s? If so, what caused the change?

In a recent article on the lessons and tradition of Franz Oppenheimer, Barkai (1999) reverts to the basic question of the viability and intrinsic efficiency of the

kibbutz economy when he refers to Oppenheimer's pessimistic forecast as expressed in his Transformation Law.

As early as the end of the nineteenth century (in 1896) Oppenheimer had claimed that producer cooperatives had no future, and that they would soon cease to exist. He cast doubt on the potential economic efficiency of collectives (in our case, the kibbutz) due to their democratic and egalitarian management system. On the other hand, he claimed that if a collective became an economic success it would accumulate capital, and the profit motive of the existing members would result in an end to their absorption of new members, and eventually to its becoming a capitalist firm.

Oppenheimer's Transformation Law, therefore, states that every successful producer cooperative would become a closed organization. "Such a closed producer organization would come to the end of its function as a cooperative" (Barkai, 1999:1-3). This kind of prediction has recently shown to be applicable to such modern models as the Producer Cooperative (PC) or the Labor Managed Firm (LMF).

This general concept was used by the current author and others to analyze the kibbutz economy. The studies carried out examined *the long-term trends* in the kibbutz economy, particularly in relation to its integration into the external labor market – the employment by the kibbutz of hired labor on the one hand, and members engaging in the outside labor market, on the other. This approach reveals the forces and processes likely to lead to the deterioration of the LMF and its conversion into a conventional Capital Managed Firm (CMF). These studies formulate propositions of existential bounds (or if viewed from the negative aspect, areas of disintegration) for the kibbutz economy, that can be viewed as Transformation Laws or Impossibility Laws complementing Oppenheimer's (see Satt, 1991; Satt and Ginzburg, 1992; Satt and Sheaffer, 1994; and Satt and Ginzburg, 1998).

Yehuda Don (1988) produced another comprehensive study of the kibbutz economy, focusing essentially on the industrialization process it was undergoing.

In this case too it is noteworthy that Don makes comparisons with relevant data relating to the industrial sector in Israel. The data in his study refer to a period up to 1983. Although Don indicates trends which give rise to a concern regarding the development of kibbutz industry, it is doubtful whether they provide an explanation for Kroll and Polovin's severe findings.

In summarizing his findings Don writes:

> In previous chapters we observed the existence of some immanent reasons for relative inefficiency in the Kibbutz, due to ideological constraints as well as insufficient levels of controls and existence of externalities, which have been present since the early stages of Kibbutz industrialization. In view of them *the pertinent question that requires explanations is the past, and to a great extent the present, level of high efficiency*.
>
> (Don, 1988:114; emphases are mine, E.S.)

In several later articles (1995, 1996, 1998) which discuss the survival of the kibbutz, Don offers what he calls the *altruism motive* as an answer to the ideological and structural constraints of the kibbutz (*i.e.*, the lack of the profit motive).

The level of welfare

Although the distinction between the objective of efficiency and that of welfare is not clear cut, it is nevertheless important and significant.

The modern approach to income measurement states that the conventional basis for measuring *product* is too narrow, and does not properly reflect the estimated level of *welfare*. Thus, for example, the well known witticism quoted by Samuelson (1973:199) that if a man marries his housekeeper, national income goes down.[4] Similarly, the fact that the working week is constantly being shortened over time does not necessarily mean that the level of welfare in the economy is falling. It may indicate a growing preference for leisure over goods and services, related to a higher income.

To correct such biases and distortions requires a reformulation of the product base, and in particular – its extension in such a way that it encompasses the whole range of productive activities and consumption of household services (including those that bypass the market), the creation and consumption of leisure and other activities

Robert Eisner (1988) performed an extensive and in-depth review of the literature on the extended approaches to modern national income accounting, which is essential for anyone interested in this field.

One of the interesting examples brought by Eisner is the pioneering work performed by Nordhaus and Tobin (1972, 1973). In order to emphasize the objective of estimating welfare, Nordhaus and Tobin changed the title of their measurement from GNP (Gross National Product) to MEW (Measure of Economic Welfare).[5] The authors' premise was that the ultimate purpose of economic activity is consumption, both present and future. To calculate the MEW measure [which Samuelson (1973: 195) proposed calling NEW (Net Economic Welfare) to emphasize the innovation], Nordhaus and Tobin proposed adding categories to the conventional product base and to remove others, according to the welfare criterion:

- The MEW measure includes activities which have *a positive effect on welfare*. For example, the values of labor which bypasses the market (mainly housekeeping) and of leisure are imputed to the index;

- On the other hand, it excludes activities having *a negative effect on welfare* ("regrettable activities") and intermediate activities required to maintain current economic activity. Examples of these are the cost of travel to work, road maintenance, and even the cost of internal and external security. Nordhaus and Tobin also excluded from their measure of welfare ecological harm, overcrowding and the damage

---

[4]   The source of this quote is uncertain. Some attribute it to Kuznets, and others trace it as far back as Alfred Marshall.

[5]   Nevertheless, MEW is still based on "objective" values of products, and not on "subjective" utility units.

caused by urbanization of modern society.

Reverting to Kroll and Polovin, it would be interesting to take this opportunity to extend the concept of what may be taken as a measure of the relative efficiency of the kibbutz economy, so that it enables a comparison of the level of welfare. The authors did perform partial comparisons regarding two subjects: the equivalent value of internal services, and the value of owner-occupied housing. They did this, however, within the definition of product base accepted used in the Israeli national accounting, and only for the purposes of the comparison.

A more extensive study would have been of intrinsic interest, and a priori it may be assumed that the kibbutz economy would have been given a higher assessment.

The interest effect

Economy with two sectors: manufacturing and financial

Kroll and Polovin describe their method of calculating the gross product of the kibbutz economy (in a schematic way) as follows:

> *Kibbutz gross product* is equal to total annual sales less payments to suppliers outside the kibbutz (including hired manpower)
> *less interest payments*
> plus computed household services and rent on self-owned houses.
> (Kroll and Polovin, 1997:24; emphases are mine, E.S.)

As will be shown below, the problems encountered in Kroll and Polovin's article relate to two main points:

- The handling of interest payments (debt financing), which is discussed in this section;
- The income-tax effect, which is dealt with in the next section.

These two factors are likely to cause significant accounting biases in estimates of the efficiency of the kibbutz economy. Moreover, both of these effects act in a negative direction, *i.e.*, they tend to reduce what is seen as the economic efficiency of the kibbutz economy relative to that of the national economy.

We will deal with the interest payments issue first. It will be seen that it is the most complex and of the greatest numerical significance in the analysis. As mentioned above, Kroll and Polovin exclude interest payments in their calculation of kibbutz gross product. We will claim that this approach is appropriate for ("absolute") measurement purposes but is incorrect as far as making ("relative") comparisons is concerned. This is so because of the *inherent structural and functional asymmetry* among the different sectors.

For simplicity, the household sector is ignored in the analysis, as are the other extended approaches referred to in the previous section. There is no theoretical problem

in incorporating them (see, for example, Satt, 1974 and 1983).

To analyze the effect this had on the results of the comparison, the following model will be examined.

Suppose first that the economy is a simple two-sector economy:

1. *A manufacturing sector*, which uses labor, capital and entrepreneurship to produce an aggregate final product, Y. In the context of this study, the kibbutz economy is included in this sector;

2. *A financial sector*, which uses labor and entrepreneurship to provide capital services to the producing sector.

For simplicity, and without a loss of generality, it is assumed that all capital is owned by the financial sector.[6]

The three factors of production in the economy are denoted as follows: labor – L; capital – K; and entrepreneurship (profit) – Π. Subscripts denote the sector in which the factor of production is employed (where the manufacturing sector is denoted as No. 1, and the financial sector – as No. 2). For clarity, the "aggregate profit function" of the conventional commercial accounting will be shown together with the "value-added function" of national accounting, which is derived from the former.

The values shown below represent values of the services provided by the factors of production, in terms of annual flows.[7]

We will represent now an illustrative example of the economy. This is only done for the sake of simplicity. The reader who is familiar with theoretical models is invited to consult concurrently the complete formal model in Appendix A, on which the example is based.

Example A

Assume a national economy with the following elements:

Total number of workers in the economy, 100	$L =$	100
Number of workers in the manufacturing sector, 70,	$L_1 =$	70
Number of workers in the financial sector, 30,	$L_2 =$	30
Wages per worker is 10	$w =$	10

For simplicity it is assumed that there is no difference between the wage in the two sectors.

---

[6] a. The significance of this definition is that those who lend to financial institutions belong to this sector.

b. If equity capital is assumed to exist in the manufacturing sector, interest debits and credits would have to be imputed to it in equal amounts, so that the result would not change.

[7] The terms which should have been used are: the value of (annual) capital services, instead of the value of capital; the value of labor services, instead of the value of labor; and the value of entrepreneurship services instead of the value of entrepreneurship. The terminology used here was chosen for purposes of simplicity.

Value of capital in the economy is 100	K	$=$	100
The cost of capital (the interest rate)[8] is 6	r	$=$	6
The total product of the economy is 1,500	Y	$=$	1,500

Equations (1) to (6) of the following example enable us to calculate the values of aggregate profit and the value-added of each sector, and hence, of the whole economy (The numbers are those of the equations in the formal model, where the letter *A* is used to denote the appendix):

1. *The aggregate profit of the manufacturing sector* (No. 1) is

$$(1) \quad 200 = 1{,}500 - 600 - 700$$

$$\Pi_1 = Y - rK - wL_1$$

value of entrepreneurship	$=$	value of product	$-$	value of capital	$-$	value of labor

Note that r is the cost of capital, so that rK are costs of debt-financing; w is the wage rate, so that wL_1 is the labor costs (of the manufacturing sector).

The calculation of the value-added is based on the generally accepted method, *i.e.*, it is the value of the product *less* expenses on outside (external) factors of production (see, for example, Satt, 1983).[9]

Therefore, *the value-added of the manufacturing sector* is

$$(2) \quad 900 = 1{,}500 - 600 = 200 + 700$$

$$Y_1 = Y - rK = \Pi_1 + wL_1$$

Value added			product		resources	

2. Similarly, *the aggregate profit of the financial sector* (No. 2) is

$$(3) \quad 300 = 600 - 300$$

$$\Pi_2 = rK - wL_2$$

value of entrepreneurship	$=$	value of capital	$-$	value of labor

and *the value-added of the financial sector* is

$$(4) \quad 600 = 600 = 300 + 300$$

$$Y_2 = rK = \Pi_2 + wL_2$$

Value added	product (capital services)	resources

---

[8] For simplicity the cost of capital has been chosen in a way that may be interpreted as a "whole percentage". Anyone familiar with handling decimal fractions would arrive at the same conclusions using the cost of capital of 0.06 with the value of capital of 10,000.

[9] This approach is also acceptable to Kroll and Polovin (1997: 24).

3. Hence, ***the total value-added of the whole economy*** is

$$(5) \qquad 1{,}500 \quad = \quad 900 \quad + \quad 600$$
$$ Y \quad = \quad Y_1 \quad + \quad Y_2$$

But from Equations (2) and (4), Equation (5) is also equal to

$$(6) \qquad 1{,}500 \quad = \quad (1500 \quad - \quad 600) \quad + \quad 600$$
$$ Y \quad = \quad (Y \quad - \quad rK) \quad + \quad rK$$

Equations (7) and (8) can be found in Appendix A of the formal model.

Note that even this basic presentation brings out a point of great importance to the issue under discussion. Whereas the value of capital appears in each sector as interest payments or receipts, rK [see Equations (2) and (4)], at the national level the two rK offset each other [Equation (6)] ! This is because the capital represents the *product of one sector* – the financial sector, but it is also a *factor of production* ("intermediate product") of another sector – the manufacturing sector. Thus including it in the overall product would be a case of double counting, comparable to adding the value of the wheat germ to the value of the loaf of bread in which it is an ingredient.

The conclusion is that in a comparison of the per capita value-added of the manufacturing sector (Y_1), from which financing costs have been deducted, with the value-added of the whole economy (Y), from which financing costs have not been deducted, the estimate of the efficiency of the manufacturing sector, including the kibbutz economy, is likely to suffer from a downward bias.

We can see it more clearly in the following way. From the above results, the values per worker (or per capita)[10] can be calculated, as is done by Kroll and Polovin (1997). This gives:

Total product per worker in the economy is 15.0 (= 1,500 / 100).

Nevertheless, although the wage per worker in the manufacturing sector is 10, the same as in the financial sector, and this can be viewed as an approximation of the value of marginal product (assuming a competitive economy), the average product per worker is different in each of the sectors: in the financial sector it is 20.0 (= 600 / 30), while in the manufacturing sector it is only 12.8 (= 900 / 70).

A comparison of the per capita product in the manufacturing sector with that of the economy as a whole would apparently indicate inefficiency in the former. The calculation would show that product per worker in the manufacturing sector is only 85 percent of that in the whole economy (12.8 / 15.0). If it is assumed that the kibbutz economy is one of seventy production units/workers (see above) making up the manufacturing sector, the results obtained would be similar to those of Kroll and Polovin.

---

[10]   For simplicity it is assumed that everyone in the economy is a worker. Alternatively, the calculations could relate to an index of "workers to members", as is done in the kibbutz accounting system.

Clearly, such a comparison is invalid, and should be avoided. The error derives essentially from the use of *average* instead of *marginal values* in calculating the output of factors of production, thereby attributing the whole value of the product to only one factor.

To conclude the discussion of the "interest effect" (debt financing), the following remarks are worth noting:

1. From a *conceptual-theoretical* point of view, a distinction should be made between the method of ("absolute") measurement of product at the level of the various sectors and the comparative ("relative") method of comparing their product with that of the whole economy.

   • At the sector level, financing costs should indeed be taken into account [see Equations (2) to (4)].

   • However, care should be taken not to engage in comparing like with unlike, *i.e.,* comparing a sector which has its own special characteristics with the whole economy [see Equation (6)];

2. *More empirically*, note that the value-added of each sector is partly a function of the financing costs (rK), *i.e.*, of the cost of capital, r, and of the size of the debt, K.[11]

Suppose that in pursuing a tight (anti-inflationary) monetary policy, the central bank in the example raised the interest rate from 6 to 10. Make the additional far-reaching assumptions that this has no additional effects of reducing the product of the manufacturing sector or increasing its debt. It can be calculated from the example that in this case the manufacturing sector will incur an aggregate loss of 200 (instead of a profit of 200), and its product (value-added) will drop from 900 to 500. At the same time the profit of the financial sector will rise to 700, and its value-added will rise to 1,000. The effect of the tighter monetary policy is that while per capita product in the economy as a whole stays unchanged at 15.0, that in the manufacturing sector plunges to less than a half, to 7.1, while that in the financial sector surges to 33.3. This seems to be a good reminiscent of what occurred in Israel in the mid- and end-1980s. It seems that this result is more a reflection of a change in transfer payments ("terms of trade") between the sectors, and thus a change in the income distribution between them, than an index of efficiency!

The report of the United Kibbutz Movement (UKM) on the crisis period and its causes in the mid-1980s, indeed states *in complete agreement with the behavior of the model* that:[12]

---

[11] As mentioned above, all capital (K) is assumed to be "foreign" (outside) capital, or debt. This is not far from the actual situation in most kibbutzim, especially since the crisis.

[12] The United Kibbutz Movement (UKM) accounted for approximately two-thirds of the whole kibbutz economy, with the Kibbutz Ha'artzi Movement and the Religious Kibbutz Movement making up the other third.

On average, the *real cost of capital* in the crisis period rose from 5 percent to 12 percent a year [!]… [Largely as a result] the kibbutzim in the United Kibbutz Movement *moved into a loss position* of NIS 23 million in 1984, compared with an aggregate profit of NIS 137 million in 1983 and NIS 67 million in 1982. In 1985 the loss increased and reached a total of NIS 300 million.

(UKM, 1989:1. At June 1988 prices; emphases are mine, E.S.)

Net financing costs of the UKM went up from NIS 36 million in 1982 to NIS 365 million in 1985 (at June 1988 prices), a tenfold increase! To put this in perspective, note that the average gross product of the UKM, before financing costs, was in the region of NIS 750 million (UKM, 1989:5);

3. In their section on the Impact of Debt Financing, Kroll and Polovin (1997: 26-28) perform a *simulation*, and deduct only "standard interest" of 5 percent from the gross product; in other words, they offset the exceptional or exorbitant interest. This exercise does indeed improve the relative position of the kibbutzim. Thus, in 1989, for example, per capita product in the kibbutz economy rose from 65 percent of the national economy, prior to the adjustment, to 72 percent after that. This is an expected result in the light of the model herein and the analysis in remark 2 above.

The reason that the effect of the adjustment carried out by Kroll and Polovin is not even greater, seems to be the great magnitude of the kibbutz debt. Again, using the data of the UKM, its net debt (at June 1988 prices) rose from NIS 816 million in 1982 to NIS 1,992 million in 1985, more than doubling in four years. In the next three years it continued to rise, reaching NIS 2,953 million in 1988 (UKM, 1989:9). These figures highlight the negative impact of the "interest effect" on the calculation of the efficiency of the kibbutz economy. Note that even "standard interest" of 5 percent on such a debt, amounts to NIS 148 million, more than half of the actual financing costs in that year;

4. An interesting question therefore arises, whether interest payments in the manufacturing sector could *simply be ignored* to enable the comparison.

Unfortunately, the answer is no. The model and the example in this section show that this intuitive solution is incorrect because it ignores the contribution of capital to the production function of the manufacturing sector. In other words, the sectors are not symmetrical (when one sector pays interest, and the other receives it), nor is there symmetry between the sectors and the economy as a whole (in which interest does not feature). Hence, they are not comparable.

From Example A it can be shown that if financing costs are ignored in the manufacturing sector, the whole value of the product will be attributed to that sector, *i.e.*, 1,500 instead of 900. Product per worker will thus be overstated, becoming 21.4 (instead of the previous value of 12.8), compared to a product of 15.0 per worker in the whole economy (which includes the financial sector).

The unavoidable conclusion to be drawn is, therefore, that comparisons of like with unlike, such as one sector with its special characteristics with the economy as a

whole, should not be made. It would be more correct to compare the kibbutz economy with similar ones, such as other agricultural economies, industrial plants or a combination of them, as was done by Barkai (1977, 1980) and Don (1988);

5. Finally, the model presented herein assumes a *closed economy* which has no capital transactions with the outside world. In such a case the conclusions drown here are entirely correct. They are also fairly correct in the case of an *open economy* such as Israel's.

It can easily be seen that the financing costs on Israel's net external debt do not exceed 1–5 percent of GNP.[13] On the other hand, in the data of the product of the kibbutz economy in 1989, for example, which Kroll and Polovin used, actual financing costs reached an average of 24 percent of the product.[14] In the Kibbutz Ha'artzi Movement alone, financing costs in that year (after appropriate adjustments)[15] came to about 35 percent.

Removing values of such magnitude from the product of the kibbutz sector is likely to result in a significant downward bias in the assessment of its efficiency relative to that of the whole economy, and apparently had a major effect on the results obtained.

The tax effect

Economy with three sectors: manufacturing, financial and public

The second effect on the measurement of the *gross product* of the kibbutz economy in Kroll and Polovin's article (1997) relates to income tax. In principle, the conceptual analysis of the "tax effect" is similar to that of the "interest effect" in the previous section, although it is simpler at the theoretical level, and apparently of less significance at the quantitative level.

Kroll and Polovin (1997:24) define disposable income as follows: "*Disposable income* is obtained by subtracting depreciation and taxes from gross production."

This is indeed the general accepted definition used in the literature. First, depre-

---

[13] The appropriate values of interest payments on Israel's external debt, as a percentage of income in Israel, are:

    1982   about 4 percent   (Bank of Israel; Annual Report 1985)
    1989   about 3 percent   (Bank of Israel; Annual Report 1993)
    1992   about 1 percent   (Bank of Israel; Annual Report 1993).

Here, the definition of income is slightly wider than that of GNP, so that these percentages should be increased marginally.

[14] These values are based on a preliminary version of their article, as the published version did not include a statistical appendix. It is assumed that even if the data changed to some extent, their order of magnitude would not have changed. The orders of magnitude referred to are supported also by the 1989 Report of the UKM on the crisis and its causes, mentioned above.

[15] The adjustments referred to here relate to increasing the value of product by the value of internal services and the value of owner-occupied-housing services, as was done in the article under discussion.

ciation is deducted from the GNP, to give Net National Product (NNP), and then taxes are deducted to obtain disposable income.

Nevertheless, a more thorough inquiry indicates that the authors may actually reverse the order. Furthermore, a comparison of the data with those in an earlier article of the authors (Polovin and Kroll, 1995)[16] indicates that the data of gross product of the kibbutzim are, may be, given *after deduction of taxes*. Note that the value of disposable income does not change as a result, but the gross product is no longer the one generally used in national accounting (before tax), but is in fact, what we will call the "gross disposable product" (after tax). If this is the case, then in comparing the gross product of the kibbutz economy to that of the whole economy there is a further accounting bias, in addition to that of "interest effect", – the "tax effect".[17]

To clarify this point, the previous example will be extended to include a public sector ("government") which imposes taxes, *T*, and supplies public goods and services, *G*. For simplicity it is assumed that the same rate of tax, *t*, is levied on labor as on profits.

Parallel with the expansion of the example, the conceptual formal model is also expanded in Appendix B. Again, there is a complete consistency between the equations in the model and in the example, but the letter A is added in the former to denote the appendix.

Example B

Suppose that the government that was established in Example A, sets an income tax, *T* of 20 percent ($t = 0.2$) on all income (labor and profit), and uses it to supply public goods and services, *G*. Also assume, for simplicity, that the tax is neutral, and that it has no further real effect on the economy.

1. ***The gross disposable product of the manufacturing sector*** will now be

$$(9) \qquad 900 * 0.8 \quad = \quad 720$$
$$\qquad\quad Y_1(1-t)$$

---

[16]   See Polovin and Kroll, 1995:322, Table 1 (Hebrew), and the article currently under discussion (Kroll and Polovin, 1997:24, Table 1).

[17]   Although the kibbutz economy does benefit from national public goods (services) that it uses, they do not appear in its accounts. Put differently, the investment in a stretch of national road which leads to the kibbutz is not included in its accounts, nor does it relate to itself the expense on the appropriate number of policemen maintaining internal security nor that on the number of soldiers engaged in providing its external security.

In this case, too, as in the case of the interest payments, it could be claimed that strictly speaking an open economy has foreign relations, on which it pays "taxes" (membership), for example, membership of United Nations organizations. These payments are certainly insignificant relative to the size of the product.

2. ***The gross disposable product of the financial sector*** will now be

(10) $600 * 0.8$ = 480

               $Y_2(1 - t)$

3. For simplicity assume a "balanced budget", *i.e.*, $G = T$; then the public *expenditure* will be

(11) $1500 * 0.2$ = 300

               $(T = Yt) = G$

The total gross disposable product (disposable income) of the two business sectors ($720 + 480 = 1,200$) may be allocated to private consumption, C, and investment, I, in the economy.[18] Public consumption (300) must be added to this, and so the total value of the product of the economy remains at its previous level of 1,500. Saving the resources in the business sectors simply made room for government demand.

This analysis shows clearly that if gross disposable product of the manufacturing sector $Y_1(1 - t)$ is compared to the national product, Y, yet another downward bias will be introduced to the assessment of the efficiency of that sector, in addition to the "interest effect".

As in the case of the "interest effect", the above effect derives from internal transfers of resources within the economy, *i.e.*, from the business sectors to the public sector. Although such transfers affect each sector, at the national level they offset each other.

Calculating product per worker after tax will reveal this new bias, in addition to the earlier "interest effect".

While product per worker in the whole economy remains unchanged at 15.0 (= 1,500/100), gross disposable product per worker in the business sectors has declined:

In the manufacturing sector it has gone down from 12.8 to 10.3 (= 720/70), and in the financial sector is has dropped from 20.0 to 16.0 (= 460/30).

Note that in this example, product per worker in the manufacturing sector, which includes the kibbutz sector, is now only 69 percent (=10.3/15.0) of that in the whole economy.

To summarize the "tax effect" on the measurement of product, note that if the product after tax of the kibbutz economy is compared with the pre-tax product of the national economy, a downward bias is created in the estimate of efficiency of the kibbutz economy.

In the numerical example above, the "interest effect" causes a downward bias of 15 percent in the measurement of the efficiency of the kibbutz economy, as product

---

[18]   For simplicity, depreciation was not included in the conceptual model, and is therefore not included in the numerical example. Its inclusion would raise no theoretical problems.

per worker in the latter is only 85 percent of that in the national economy. The "tax effect" creates a further 16 percent bias, reducing the product per worker from 85 percent to 69 percent of the national figure.

However, perhaps herein lies a clue to what values might be more *appropriate for comparison purposes*. As the problem is now symmetrical between the sectors, with the tax imposed equally on the two kinds of businesses, and a comparison can be made with total disposable income, the bias can be corrected in two ways:[19]

- **By being consistent in comparing pre-tax product**

Gross pre-tax product of the kibbutz economy, Y_1 is compared with the pre-tax product of the whole economy, Y. This is exactly what was done in the previous section, and this gave product per worker in the kibbutz economy relative to that of the whole economy of 85 percent (=12.8/15.0);

- **By being consistent in comparing after-tax disposable income.**

In the second method, disposable income (after tax) of the kibbutz economy, $Y_1(1 - t)$, is compared with that of the national economy, $Y(1 - t)$. Example B gives, in this case, the following results: disposable income per worker in the manufacturing sector is 10.3 (=720/70), and that in the whole economy is 12.0 (=1,500*0.8/100), thus returning to the same efficiency ratio of 85 percent (=10.3/12.0).

Although both methods still suffer from the "interest effect", the 'tax effect' which reduced the relative efficiency to 69 percent, has been avoided.

This analysis shows that the comparison of disposable income in Kroll and Polovin may be less biased than is the comparison of the gross product. The data in Tables 2 in Kroll and Polovin (1997:25) show that in 1982 per capita disposable income in the kibbutz was 94 percent of the national figure. Bearing in mind the significance of the "interest effect", it may be supposed from here that until 1982 at least, prior to the severe economic crisis, the kibbutz economy was not less efficient than the national economy, and may actually have been more efficient.

From the data available, it is difficult to draw conclusions regarding the steep decline of per capita disposable income in the kibbutz economy in the period that followed: in 1989 it dropped to 48 percent of the national figure, in 1992 it was 53 percent, and in 1994, 61 percent (Kroll and Polovin, 1997:25).

It appears that several major causes were responsible, the general direction of which can only be roughly estimated here:

1. *Interest payments* (debt financing) rose very drastically in the crisis period. Data from the UKM show an eightfold rise (net), from NIS 36 million in 1982 to NIS 292 million in 1988, both at June 1988 prices (UKM, 1989:8);

2. *Tax payments*, on the other hand, did not rise, and may actually have fallen as a result of the decline in profitability. The UKM figures indicate stability in this area: NIS 43 million in 1982 compared with NIS 46 million in 1988 at June 1988 prices (UKM, 1989:8);

---

[19]   This is so at least at the conceptual, qualitative level, if not at the quantitative level.

3. ***Depreciation*** on earlier investments rose significantly, as Kroll and Polovin note (1997: 25–26), pointing out the connection between disposable income and previous investment. The UKM report shows an increase of 50 percent in productive and consumer depreciation between 1982 and 1988 (UKM, 1989:5). This may be the result of the acceleration in investment in the years prior to the crisis;

The investment factor itself is of great interest and importance in this context, affecting almost any aspects of economic analysis: productivity and product growth; the level of savings; and the extent of depreciation, among others. However, as no data relevant to this point are given by the authors, we will not discuss it further;

4. Finally, and maybe most importantly, the *intense shock* caused by the crisis had a severe effect on the kibbutz economy and society, and resulted in a *real decline in its output*.

In the UKM report (UKM, 1989: Chapter 1) an interesting attempt is made to assess the causes of the crisis in greater detail.

Summary and conclusions

This article examines conceptual problems in measuring product and disposable income of the kibbutz economy, and comparing them with figures of the national economy. The main conclusion is that comparing sectors, which have their specific characteristics, with the whole economy, is a hazardous undertaking, and is subject to serious biases. This is because the "terms of trade" between the sectors, and the implied income transfers, affect the value of per capita product in all sectors, and may be misinterpreted as relative efficiency or inefficiency of the sectors.

At the level of the *national accounting theory*, this conclusion may be summarized as a proposition:

> **Proposition:** *Logical conditions for comparing products of different sectors*
> From a logical point of view, using national accounting tools ("value-added") to compare different economies is a *necessary but not sufficient condition*. Other considerations relating to *structural and functional similarities* among the economies/sectors (referred to in the article as symmetry) must also be taken into account.

This claim is a familiar one in the literature with regard to comparisons of different national economies, for example, the US and China. This article extends it to the sphere of different sectors of a given economy, and hence to the comparison of each sector with its national economy.

Two major points arising from Kroll and Polovin's article (1997) could cause downward bias in a comparison of the kibbutz economy with the national one: the "interest effect" and the "tax effect".

The "interest effect" is apparently the more significant one. The two-sector model

in the current article shows that whereas it is appropriate to deduct interest from the calculation of the ("absolute") value-added of the manufacturing sector (and the kibbutz economy), the latter cannot be compared ("relatively") to that of the whole economy. This is so since at the national level, interest paid by the manufacturing sector is offset by interest received by the financial sector.

The simulation performed by Kroll and Polovin when they restricted real interest to a "standard" level of 5 percent (ignoring the exceptional or "exorbitant" interest) only partially corrected the result, due to the huge size of the kibbutz debt.

A similar conclusion was reached regarding *the "tax effect"*. In a three-sector economy (extended to include the public sector) it was shown that conceptually the value of the product of the manufacturing sector (the kibbutz economy) *after tax* cannot be compared to that of the national economy, because the deduction of tax payments in the national economy is offset by additional public consumption. In this case too there is an income transfer from the business sectors (both manufacturing and financial) to the public sector.

Within the limitations of time and space of the current article it is not possible to estimate the overall downward bias in a comparison of the kibbutz per capita product with the national one. It seems, however, that one would not be far wrong in assessing it in two-digit, rather than single digit percentage terms.

Regarding the kibbutz economy itself, the main question requiring attention is how compatible are Kroll and Polovin's (1997) findings with those of earlier research, mainly that of Barkai (1977, 1980) and Don (1988), which showed the relative economic robustness of that economy. Of specific interest is the central question of what happened to the kibbutz economy in the severe crisis of the 1980s. Why did what appeared till then to be a relatively sound economy, suffer so greatly as to jeopardize its very survival? And in particular, how did the real (net) interest payments of the United Kibbutz Movement rose tenfold in real terms in the years from 1982 to 1985? And how did the real debt more than double in those years?

Finally, could it be that it was not structural inefficiency of the kibbutz economy that led to the crisis, but on the contrary, that the external—mainly financial—crisis and the shock it brought in its wake, led to what was seen as economic inefficiency?

These questions require further research which would be based *inter alia* on the data gathered and brought by Kroll and Polovin, taking into account the lessons and conclusions of the current article.

References

Bank of Israel (1985; 1993). *Annual Report*.

Barkai, H. (1971). *The Operational Rules of Kibbutz Production*. Jerusalem: National Science Academy of Israel, 16.

————— (1977). *Growth Patterns of the Kibbutz Economy.* Amsterdam: North-Holland Publication.

————— (1980). *Development of the Kibbutz.* Jerusalem: The Morris Falk Institute for Economic Research (Hebrew).

————— (1999). Franz Oppenheimer's Transformation Law and the Recent Trend towards Privatization in the Kibbutz. Jerusalem: The Hebrew University, Department of Economics, Working Paper No. 10.

Cohen, A. (1982). "Using National Accounting Concepts in an Economic Analysis of the Kibbutz Economy". *The Economic Quarterly,* 113:193-199 (Hebrew).

Don, Y. (1988). *Industrialization of a Rural Collective*. Aldershot: Avebury.

————— (1995). "Altruism and Cooperative Survival". *Advances in Economic Analysis of Participatory and Labor-managed Firms,* 5:185-204.

————— (1996). "The Importance of Behaving Altruistically". *Journal of Rural Co-operation,* 24:17-25.

————— (1998). "The Kibbutz: Issues of Existence and Models of Survival". *Journal of Rural Cooperation*, 26:119-128.

Eisner, R. (1988). "Extended Accounts for National Income and Product". *Journal of Economic Literature,* 26:1611-1684.

Kroll, Y. and Polovin, A. (1997). "Productivity and Consumption in the Kibbutz System at a Time of Crisis: Measurement and Comparison to National Statistics". *Journal of Rural Cooperation,* 25:21-31.

Nordhaus, W.D. and Tobin, J. (1972). *Economic Growth.* New York: NBER.

————— (1973). "Is Growth Obsolete?" in M. Moss (ed.) *The Measurement of Economic and Social Performance.* New York: Columbia Univeristy Press for NBER, 38:509-532.

Peleg, D. (1982). "Remarks on the Use of National Accounting Concepts in the Kibbutz". *The Economic Quarterly,* 115:425-427 (Hebrew).

————— (1984). "A model of the National Economy as an Accounting Basis, the Discussion Continued". *The Economic Quarterly,* 120:100-101 (Hebrew).

Polovin, A. and Kroll, Y. (1995). "Product and Disposable Income in the Kibbutz". *The Economic Quarterly,* 42:317-330 (Hebrew).

Samuelson, P. A. (1973). *Economics.* New york: Mcgrew-Hill.

Satt, E. (1974). *The Kibbutz Economy in Terms of the National Economy – An Examination of Measurements of National Income and its Implications on the Kibbutz Economy's Accounts.* Ruppin Institute (Hebrew).

————— (1983). "The Kibbutz in a 'Firm Model' or in a 'National Model': A Contribution to the Discussion". *The Economic Quarterly,* 118:801-810 (Hebrew).

————— (1984). "A Conceptual Framework for an Analysis of the Kibbutz Economy". *The Economic Quarterly,* 122:299-301 (Hebrew).

————— (1991). "'Reward for Contribution' on the Kibbutz – Lessons from the LMF Model*". The Economic Quarterly,* 147:372-386 (Hebrew).

Satt, E. and Ginzburg, H. (1992). "On the Dynamic Effects of Using Hired Labor in the Kibbutz". *Journal of Comparative Economics,* 16:688-700.

———— (1998). On the Effects of the Kibbutz Hiring Out its Own Labor Force. *Advances in Economic Analysis of Participatoty and Labor-managed Firms,* 6:187-212.

Satt, E. and Sheaffer, Z. (1994). "The Anatomy of Using Hired Labor in the Kibbutz –Interdisciplinary Approach and New Data". *Journal of Rural Cooperation,* 22:131-147.

The United Kibbutz Movement (UKM) (1989). *The Economic Crisis in the Kibbutzim of the United Kibbutz Movement, 1984–1988, Principles and Lines of Action to Deal with the Crisis.* Tel Aviv: United Kibbutz Movement (Hebrew).

Zusman P. and Gal, Y. (1984). "Aggregate Analysis of the Smallholders' Settlements Economy using the National Accounting Method". Lecture at a Conference, the Hebrew University of Jerusalem, Department of Agriculture, Rehovot, 24.1.84 (Hebrew).

Appendix A

A Formal Model of Economy with Two Sectors: Manufacturing and Financial

The values shown below represent values of the services provided by the factors of production, in terms of annual flows.[20]

1. The manufacturing sector

  a) Aggregate profit

$$(1A) \qquad \Pi_1 \quad = \quad Y \quad - \quad rK \quad - \quad wL_1$$

value of $\quad$ = $\quad$ value of $\quad$ − $\quad$ value of $\quad$ − $\quad$ value of
entrepreneurship $\qquad$ product $\qquad$ capital $\qquad$ labor

  where r is the cost of capital, so that rK are costs of debt-financing; w is the wage rate, so that wL_1 is the labor costs (of the manufacturing sector).

  b) Value-added of the manufacturing sector
  The calculation of the value-added is based on the generally accepted method, *i.e.*, it is the value of the product *less* expenses on outside (external) factors of production (see, for example, Satt, 1983).[21]

$$(2A) \qquad Y_1 \quad = \quad Y \quad - \quad rK \quad = \quad \Pi_1 \quad + \quad wL_1$$

product $\qquad\qquad$ = $\qquad$ resources

2. The financial sector

  a) Aggregate profit

$$(3A) \qquad \Pi_2 \quad = \quad rK \quad - \quad wL_2$$

value of $\qquad$ = $\quad$ value of $\quad$ − $\quad$ value of
entrepreneurship $\qquad$ capital $\qquad$ labor

  b) Value-added of the financial sector

$$(4A) \qquad Y_2 \quad = \quad rK \quad = \quad \Pi_2 \quad + \quad wL_2$$

product $\quad$ = $\qquad$ resources
(capital services)

---

[20]   The terms which should have been used are: the value of (annual) capital services, instead of the value of capital; the value of labor services, instead of the value of labor; and the value of entrepreneurship services instead of the value of entrepreneurship. The terminology used here was chosen for purposes of simplicity.

[21]   This approach is also acceptable to Kroll and Polovin (1997:24).

3. The whole economy

$$(5A) \qquad Y \quad = \quad Y_1 \quad + \quad Y_2$$

But from (2) and (4),

$$(6A) \qquad Y \quad = \quad (Y \quad - \quad rK) \quad + \quad rK$$

$$(7A) \qquad Y \quad = \quad (\Pi_1 \quad + \quad wL_1) \quad + \quad (\Pi_2 \quad + \quad wL_2)$$

so that

$$(8A) \qquad Y \quad = \quad (\Pi_1 \quad + \quad \Pi_2) \quad + \quad w(L_1 \quad + \quad L_2)$$

$$\text{total value} = \qquad \text{total value of} \qquad + \qquad \text{total value of}$$
$$\text{of product} \qquad \text{entrepreneurship} \qquad \qquad \text{labor}$$

Appendix B

A Formal Model of Economy with Three Sectors: Manufacturing, Financial, and public

The previous model (in Appendix A) is extended to include a public sector ("government") which imposes taxes, *T*, and supplies public goods and services, *G*. For simplicity it is assumed that the same rate of tax, *t*, is levied on labor as on profits.

The model is expanded thus:

1. ***Gross disposable product*** (disposable income) ***of the manufacturing sector*** will now be [from (2)]

$$(9A) \qquad Y_1(1 - t) = (\Pi_1 + wL_1)(1 - t)$$

2. Similarly, ***gross disposable product of the financial sector*** will now be [from (4)]

$$(10A) \qquad Y_2(1 - t) = (\Pi_2 + wL_2)(1 - t)$$

3. ***The national product*** will be

(11A)　　　　$Y = [(\Pi_1 + \Pi_2) + w(L_1 + L_2)](1-t) + G$

For simplicity assume a "balanced budget", *i.e.*, $G = T$; then

(12A)　　　　$G = Yt = [(\Pi_1 + \Pi_2) + w(L_1 + L_2)]\,t$

from (8A).

Now by substituting (12A) into (11A), it can be seen that the national product has not changed from the case without a public sector:

(13A)　　　　$Y = [(\Pi_1 + \Pi_2) + w(L_1 + L_2)]\,[(1-t) + t]$

　　　　　　or

(14A)　　　　$Y = [(\Pi_1 + \Pi_2) + w(L_1 + L_2)]$

as before in (8A). Saving the resources in the business sectors simply made room for government demand.