A CLARIFICATION OF CHINESE DEVELOPMENT STRATEGY SINCE 1949

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INTRODUCTION

DESPITE the continued deepening of scholarly knowledge of the main features of China's early economic development, there still appear many gaps and a need to clarify fundamental issues. One such issue is that relating to the means by which China's industrialization program in the First Five-Year Plan was financed. Virtually all explanations run in terms of one or both of the following: Either development was financed by an *internally* generated agricultural surplus reinvested into industry after first being realized in some appropriate form such as units of foreign exchange [8] [10] [39]. Or else, the main stress is put on the significance of Soviet credits, i.e., an *external* surplus, as the crucial source of finance [1] [38]. Although not formalized, the theoretical framework is implicitly one of a dual economy with the two sectors variously defined as "agriculture and industry," "farm and non-farm," although sources which follow the official Chinese government line talk in terms of a three-sector model—distinguishing "heavy" from "light" or handicraft industries in addition to agriculture [22] [3].

Our objectives in this paper are first, to reconsider the validity of the two major explanations offered to explain China's industrialization. In so doing, we will find that neither is entirely convincing (Section I).

We are led therefore to question whether a proper conceptualization of a "surplus" has been made (Section II) and to replace the dual sector framework with an alternative based on modern developments in economic theory (Section III). We then apply our alternative to the empirical data available for China in 1952 and thereby point out various clarifications to the general question under study (Section IV). Section V concludes with some points of relevance to the reinterpretation of the past in China's development experience.

I. TWO ALTERNATIVE EXPLANATIONS

The idea, clearly inspired by Soviet experience, that in the context of a dual economy agriculture provides the surplus needed for the initial phase of modern industrial growth, has a long and distinguished history [33] [30] [20] [18]. It has also been the main conceptual apparatus applied in the analysis of China's early industrialization strategy under Communist rule, an understanding supported by a reading of Mao's own writing such as "Ten Great Relationships" which also

reflects a tendency to dichotomize or divide a unity into two opposing parts [13]. What this approach necessarily implies is the existence of *unequal exchange,* some transfer without counterpart, from one sector (agriculture) to another. The unequal exchange reflects a transfer of substance ("value") from one side of an equation to another which would not occur if exchange was equivalent, i.e., equalized in terms of some common denominator.

Now when we turn to consider Chinese development experience, it is in fact very difficult to establish the existence of any such unequal exchange. The agricultural tax, paid without recompense, is clearly the nearest we can come to observing directly unequal exchange in a concrete form.

However, this tax had already reached its peak in the 1951 calendar year and thereafter declined [1, Table 4]. In aggregate, at its maximum it amounted to 43.7 million catties (21.85 million kilos) or enough to feed a population of about 100 million at prevailing ration levels—less than half the estimated total nonagricultural population at this time (219 million in 1952 [23, Table 24]). Other possible sources of accumulation have to be sought and researchers have looked at *marketed* commodities, including labor power of agriculture as a possible source.

If the actual prices at which the agricultural sector exchanged commodities did imply unequal exchange, then there will occur a net transfer of "value" between the two, a transfer somehow embodied in the monetary flows taking place between sectors. Now, *given balanced money flows between sectors,* a sufficient condition for this unequal exchange to occur is for prices received by agriculture to be below values and vice versa for industry. That this will be the case if agriculture has a lower than average "organic composition of capital" and the economy has only one general or uniform rate of profit, has been known for a considerable time [28, Chap. 9] [36]. Further, if a monopoly or higher than average rate of profit is earned in the sector with the higher than average organic composition ("industry") then prices will exceed values in that sector by an even greater proportion [19]. Empirically, it appears that this structure of organic compositions does apply in China (see Section IV), and it would also seem reasonable to assume such a differential profit rate in favor of the state sector in post-1949 China.

Alternatively, if prices are proportioned to values, then observations of actual money flows will give a direct indication of unequal exchange. In particular, a value transfer will be indicated by an *excess* of the *money value* of marketed agricultural commodities sold to nonagriculture over the money value of agricultural purchases, i.e., an agricultural "money export surplus."

In view of the above, Ishikawa's finding that in China the "farm sector" was in fact a net *importer* in terms of monetary flows, certainly after 1955 and even before that time, depending on the actual series used [16, Table 1], represents a serious blow to the basic hypothesis being advanced.[1] Whilst, as we attempt to

[1] For a similar "anomaly" in the Russian case, see Ellman [11, Table 8]. Ellman quotes figures by Barsov, to show that, measured in terms of 1928 prices the agricultural surplus was consistently *negative* during the period 1928–32.

show, this finding neither proves nor disproves anything about the pattern of unequal exchange, certainly the doubt it lays is sufficient to warrant some further analysis, in particular regarding classification of sectors and the accounting for different monetary flows [5]. However, no deeper analysis appears to have been so far undertaken along these lines, nor have any attempts been made to link the observed results to a basic theory of value. Moreover, the consensus still prevails that industrialization was financed by taxing the "consumer goods sector" [32] of which presumably agriculture represents the dominant component.

We turn next, to the alternative explanation which emphasizes the role of external finance and in particular Soviet credits in financing industrialization. The most comprehensive discussion on the basis of the incomplete information available, is provided by Eckstein [8, Chap. 5]. Eckstein appears to accept Mah's hypothesis [25], of a total Soviet contribution to economic construction in China between 1950–55 of 1,720 million rubles or yuan at the "trade ruble rate" [8, p. 157]. Now, total fixed capital investment during the period 1952–55 according to official sources, amounted to 30,730 million yuan [8, p. 43, Table 3.2]. So, Soviet credits amounted to no more than 5.6 per cent of total fixed investment during this period and an even smaller percentage if the time period is increased beyond 1955 or circulating capital is included. Although clearly important qualitatively, according to these comparisons Soviet aid per se is clearly of relatively little quantitative significance.

China's industrial development would appear to have been financed largely from internal resources. We must redirect our attention therefore to establishing that this was so and also to clarifying the manner in which it was to be accomplished.

II. PREVAILING CONCEPTUALIZATIONS OF THE "SURPLUS"

In the development literature on China, four different conceptualizations of the "surplus" may be found. These are: (1) from the level of *distribution,* e.g., the non-wage component of value added [35]; (2) from the level of *exchange* or markets, e.g., marketed produce of agriculture [1] [12] [15] [16]; (3) from the level of *production,* i.e., surplus produce [24]; (4) from the level of *ideology,* i.e., motivating latent untapped forces of the Chinese people [26] [34] [10]. Each has a number of particular difficulties associated with it. For instance, if a distributional surplus approach is adopted, then the elimination of its major components (landlords' rents, interest, and profit) after 1949 amounts in effect to an elimination of the agricultural surplus and hence one is forced into the certainly unconventional argument that China developed on the basis of *reducing,* not raising, as in Lewis' vision, its rate of saving. Such an argument is alluded to by Perkins on the basis of Riskin's findings, that a significant distributional surplus existed. Perkins suggests that the distribution of income in China in the 1930s may have been "dysfunctional" to development implying that the allocation of the surplus was somehow conspicuously wasted [31, p. 128].

The weakness of using a distributional approach is that it fails to attach suf-

ficient importance to the roles played by the agents receiving the surplus in actually helping to realize it in the form of money. Interest and merchant profits reflect returns to agents concerned with the marketing or in general circulation of commodities; money is the universal form in which other commodities can be bought and the reproduction process renewed. Landlords, rents may in one sense be considered a revenue component of a surplus; but they may just as well be considered a source of demand. They may be spent on luxuries or on materials of labor for production or for replacement of the landlord's used up machinery or his land's fertility, moves which will enable the landlord to sustain his level of revenue into the future. They may be transferred by taxation in Meiji landlord style or by other institutional means, to the nonagricultural sector. Taking a view that these linkages were insignificant must be backed up by at least some analysis of the structure of production and imports particularly of luxury goods, as well as a study of patterns of allocation of various types of revenue. This is not however, the focus of the distributionists.

Analyses at the level of exchange also reflect an inadequate conceptualization of the surplus. Whatever precise measure is used, all researchers would agree that a surplus must be defined in terms of an excess over some fixed (not necessarily minimum biological) amount which will enable the worker or productive unit to reproduce itself from period to period. If this basis is accepted, then market exchanges cannot represent a potential source of savings in any unambiguous way: At least, some part of the market value of farm produce or handicraft sold as commodities, will be used to purchase other commodities necessary for the reproduction of labor effort or the production process. A properly defined concept of surplus ought clearly to exclude this necessary component, i.e., determine a limit separating the two parts.

Viewing the problem from level (3), that of surplus production, it is possible to avoid some of the confusion between exchange value and surplus value as under (2). It is, in theory, quite straightforward to establish a surplus estimated in terms of a *material excess* of production over and above that required to reproduce the necessary inputs for the following period.[2] The problem is a more practical one. The information that would enable the precise calculation of such physical surpluses, and the prices required to aggregate them are not available. It is only really feasible to calculate the physical surplus of a homogeneous commodity, usually foodgrains, and in general because of the aggregation problem these calculations ignore replacement for used up materials and machinery, i.e., are again not entirely accurate estimates of what they are taken to represent. In addition, how does a physical amount of surplus produce (grain) become transformed into an investible "machinery fund" for heavy industry? Some consideration of market linkages, both internal and external, which enable revenues to be realized in a suitable form (e.g., foreign exchange) is surely needed. Again this is not the focus of researches undertaken under type (3).

As far as we know, no attempts have been made to estimate the magnitude

[2] See [37]. Necessary in relation to a stationary state, usually.

of effects arising under heading (4) above. Their main significance lies in their influence on the intensity of work effort throughout the economy and is independent of technical factors such as seasonal labor shortages, or the amount of capital already installed in any particular department. Again it would be difficult to establish any unambiguous link between this form of surplus labor and the existence of unequal exchange. Whilst clearly of basic all-round importance, emphasis on this aspect is strongest in the period leading up to the Great Leap Forward and at various stages since. As we are concerned here with the issue of the sources of industrialization and growth in the First Five-Year Plan period, influences under the general heading (4) above will not be considered further in this paper.

In sum, whilst each has its particular merits, none of the methods previously used is entirely satisfactory in answering the fundamental question under study. Most studies have paid too little attention to the circulation of commodities between different branches of the economy. Moreover, it seems unlikely that a dual sector model is appropriate for the Chinese case where it has been recognized, even from the earliest official documents, that, at the least, a three sector breakdown with light and heavy industrial departments separately treated is required [22].

III. A GENERAL APPROACH

The following model attempts to overcome the difficulties alluded to in the previous section. Its intellectual heritage is Marx [27], Sraffa [37], Leontief [21], and it is a hybrid of these approaches. To begin with, we simplify the Chinese economy at the start of its planned industrialization into three departments. These are identified, not according to their geographical location ("urban"/"rural") nor their production processes ("farm"/"non-farm", "agriculture"/"industry") but *according to the nature of the use value which they produce.* Department 1 produces *Instruments of Labor.* Department 2 produces materials of labor for feeding labor, i.e., *Articles of Final Consumption.* Department 3 produces *Raw Materials of Labor,* either for final or for intermediate consumption. In the case of auxiliary materials which are used up within a department (e.g., cotton yarn or pig iron), these are classified according to the nature of the final use value which they help to produce (i.e., to departments 2 and 1 respectively in the above instance). Auxiliaries which cannot be classified along these lines, e.g., electricity/transport are allocated in proportion to the relative importance of the demand of their final users, using the value of production as a proxy for this demand. Appendix Table I gives a breakdown of the precise content of each department for China in 1952, using this particular method of disaggregation.

The (exchange) value of a single (annual) turnover of production ("cost of supply") for a particular department i is given by W_i and is expressed in terms of money, 1952 yuan, according to the usual formula:

$$W_i = C_i + V_i + S_i \,. \qquad (1)$$

There is no presumption that these "prices" are proportional to values in any Marxist sense. They are simply observed exchange values. C_i represents intermediate goods or constant capital used up annually in i, V_i are payments to wages and S_i is surplus value in money terms, i.e., non-wage payments out of "value added."[3] The concept of a surplus used here is therefore more general than any referred to in Section II above. It encompasses both the physical produce and distributional forms and its presence is taken to reflect a value substance lying below these surface forms, i.e., *"surplus value."* It is also, as we shall see (Section IV C) compatible with either a positive or negative "surplus" when this is analyzed from the level of exchange.

C_i is constant capital delivered to department i and has its origin either internally (symbolized as C_{ii}) or in one of the other departments C_{ji}. It comprises both instruments and materials of labor which may be delivered either from abroad or from local supplies (indicated by the superscripts A and B respectively).

So we may write the three-departmental schema as follows:

$$\begin{aligned} &C_{11}{}^{A}+C_{11}{}^{B}+C_{21}{}^{A}+C_{21}{}^{B}+C_{31}{}^{A}+C_{31}{}^{B}+V_1+S_1=W_1\,,\\ &C_{12}{}^{A}+C_{12}{}^{B}+C_{22}{}^{A}+C_{22}{}^{B}+C_{32}{}^{A}+C_{32}{}^{B}+V_2+S_2=W_2\,,\\ &C_{13}{}^{A}+C_{13}{}^{B}+C_{23}{}^{A}+C_{23}{}^{B}+C_{33}{}^{A}+C_{33}{}^{B}+V_3+S_3=W_3\,, \end{aligned} \tag{2}$$

where $C_{ij}{}^{A}$ $(i, j=1, 2, 3)$ is constant capital of type i delivered to sector j and coming from abroad A.

Because of the categorization of the three departments, there will be certain i/j combinations which are not feasible. Department 2 can never deliver constant capital to department 1 or 3 because its use values are destined for final consumption or internal reprocessing. Consequently, we may simplify the array of C_{ij} values $\tilde{C}$ to:

$$C=\begin{bmatrix} C_{11}{}^{A+B} & 0 & C_{31}{}^{A+B} \\ C_{12}{}^{A+B} & C_{22}{}^{A+B} & C_{32}{}^{A+B} \\ C_{13}{}^{A+B} & 0 & C_{33}{}^{A+B} \end{bmatrix}. \tag{3}$$

In addition, we account for exports X_i by the following equation,

$$W_i=D_i+X_i\,, \tag{4}$$

where D_i are deliveries of department i to local demand and X_i are deliveries to foreign demand (exports).

Equation system (2) gives supply or cost of production conditions. In order to establish certain equilibrium conditions, it is necessary to make some assumptions about demand. We assume initially that China in 1952 had recovered to such a state as to be able to provide somehow for the replacement of its own

[3] Value added is placed in inverted commas since "S" is not the same as value added in the traditional Leontief formulation (1) includes depreciation of capital stock under "c" rather than as part of "value added" as in orthodox formulations.

used up capital, but that it had not yet embarked on its planned industrialization drive. It is in this respect ("simple reproduction" [28, Vol. 2, Chap. 20]) that we may interpret the completion of the period of rehabilitation (1949–52) which had seen the restoration of productive facilities approximately to the level existing in 1933 [9]. In sum, we assume that *deliveries* to intermediate and final uses implied that these deliveries were actually *used up*. We shall further assume that all surplus value $\sum S_i$ was consumed by "unproductive classes." Under these assumptions, the equilibrium conditions enabling simple reproduction to occur would be as follows:

(i) Articles of consumption including productive consumption (products of 2 and 3)

	Demand	*Supply*
Sources:	Intermediate+Final Consumption+Export	Local+Imports

$$C_{22}{}^{A+B}+\sum^{i=1,2,3} C_{31}{}^{A+B}+\sum^{i=1,2,3} V_i+\sum^{i=1,2,3} S_i+X_2+X_2=W_2+W_3+M_2+M_3\,. \tag{5}$$

In (5) M_i refers to imports of department i destined for final consumption (i.e., $i=2, 3$). Substituting from (2) and (3) for W_i, (5) can be simplified to give:

$$C_{31}{}^{A+B}+X_2+X_3+V_1+S_1+C_{12}{}^{A+B}+C_{13}{}^{A+B}+M_2+M_3\,. \tag{6}$$

Equation (6) is a straightforward "reciprocal demand" condition stating that the demands for products of departments 2 and 3 emanating from outside—LHS of (6)—must be reciprocated by 2 and 3's own demand for products of department 1, originating either domestically or from abroad—RHS of (6).

(ii) Instruments of labor (product of 1)

Demand	*Supply*
Uused up instruments +Exports	Local production +Imports

$$C_{11}{}^{A+B}+C_{12}{}^{A+B}+C_{13}{}^{A+B}+X_1=W_1+C_{12}{}^{A}+C_{13}{}^{A}\,, \tag{7}$$

which again using (2), simplifies to give

$$C_{31}{}^{A+B}+V_1+S_1=C_{12}{}^{B}+C_{13}{}^{B}+X_1\,. \tag{8}$$

Equation (8) is a reciprocal demand condition for instruments of labor, analogous with (6).

The significance of conditions (6) and (8) can be explained as follows. In a closed general equilibrium system such as (2), there is in fact only one reciprocal demand condition, since the requirements of one sector must cancel the other out [27, Chap. 20]. When the model is opened up to foreign trade there will *in general* be two different conditions such as (6) and (8); only in a special case

will (6) and (8) be the same.[4] Now in effect, the results obtained in estimating (2) directly from actual data are very unlikely to satisfy (6) or (8). The obvious reasons for this are *either* simple reproduction did in fact occur, but, due to differences in the *durability* of certain products, not all deliveries were actually used up in one turnover (year). Therefore, the calculated C_{ij} values do not represent what they are supposed to. Or else, the economy had already been rearranged for *"expanded reproduction,"* so irrespective of the turnover problem, (6) and (8) will not hold [19, p. 18]. Because of the accepted premise that reconstruction was completed by 1952, i.e., the stock of run down/destroyed durable goods had been replaced, differences in the actual conditions from the specified ones are taken to reflect the second explanation.

In interpreting the actual results, we will also be able to estimate the role of foreign trade and aid in bringing about this required allocation for growth, for it is foreign trade and aid which will fill the balance of excess demands resulting from inequalities arising under (6) and (8). With expanded reproduction, we have, instead of equalities, two excess demand conditions, i.e.,

$$ED_{2+3} = \text{LHS of (6) minus RHS of (6)} \qquad (6')$$

$$ED_1 = \text{LHS of (8) minus RHS of (8)}. \qquad (8')$$

Together, total excess demand (ED^*) is balanced by the difference between (a) flows of intradepartmental imports from abroad, not included in (6) or (8), and (b) foreign credits F, i.e.,

$$ED_{2+3} + ED_1 = ED^* = C_{11}^A + C_{32}^A - F. \qquad (9)$$

Equation (9) is an overall balancing condition under expanded reproduction assumptions and can be used to "close the system" given the existence of excess demands in either department (6′), (8′), and a trade deficit ($F>0$) such as will be found in the empirical context of this application to China in 1952.

Having estimated our model, we will be in a position to assess what was likely to have been the relative importance of different departments, including foreign aid in *directly* financing industrialization during the coming period. To do this, we calculate a potential reinvestable surplus coefficient r_i for each department, defined as:

$$r_i = \frac{S_i}{\sum S_i}, \qquad (10)$$

or for foreign aid,

$$r_F = \frac{F}{\sum S_i}. \qquad (10')$$

In addition to its direct contribution as given by (10′), expression (9) will provide an illustration of the *indirect* contribution of trade and aid in helping achieve

[4] Equations (6) and (8) are the same only if $X_1 = C_{12}^A + C_{13}^A + M_2 + M_3 - X_2 - X_3$, an expression lacking any intuitive interpretation.

actual market "equilibrium" in either subgroup, i.e., consumer and producer goods.

The point is often made, in discussions concerning the role of agriculture in the economic development of countries such as China and Russia, that it plays not only a direct role in providing savings for growth, but also an additional role through its contribution via its *exports* of food and raw materials, to foreign exchange [8, p. 57] [14, p. 25] [17]. However, it is rarely pointed out that agriculture is also a source of both intermediate and final *demand* for imports, often a very large source, given its great absolute size and the smallness of other industrial sectors. So, it is its net contribution which is more important to discover. Indeed it is interesting to recall that China, as a whole, was a net *importer* of foodgrains and cotton in most years before 1949 [8, p. 57] so the actual role of foreign trade in agricultural products and foreign aid in financing the overall Chinese development strategy would seem to require certain clarification.

Finally, we can use our results to calculate, on a flow of funds bases, *a pattern of resource flows* between departments. This may help us to clarify the potential contradiction, noted from Ishikawa, regarding the likely contribution of the farm sector to the post 1949 Chinese development experience.

IV. ESTIMATION AND APPLICATION OF THE GENERAL APPROACH

A. *The Data Used*

The actual methods used to apply our model to Chinese data are explained in detail in Appendix Tables I to IV. Here, we will give a summary of the most important points.

1. *Production*

We have used as the basis of our calculations the Liu and Yeh estimates of *material production* for the year 1952. Appendix Table I classifies the subbranches which have been identified either in 1933 or 1952 into the three-departmental schema outlined in Section II. We have included transport and communications as part of material production, but not trade. Merchant profits and wages paid by mercantile and other enterprises involved in circulation are therefore included in the "S" component of value as in Marx's original treatment [28, Chap. 17]. In cases such as transportation where a subbranch delivers production to more than one destination, we have distributed the aggregate delivery in proportion to the aggregate outputs of the receiving departments.

2. *Labor income*

Aggregate labor incomes are based on Liu and Yeh's data for employment by industrial sector in 1952 which, in turn, are based on official Communist figures. The only substantial alteration in our calculations has been to reallocate the numbers in joint agricultural and subsidiary occupations from "agriculture,"

where they were originally classified, into department 2. This is done because in our schema a very narrow definition of department 3 which limits itself to the actual process of growing raw materials of labor is adopted. Clearly, any classification in terms of men rather than labor time is going to be an inaccurate index of actual labor input when an economy is characterized by a lack of specialization in employment, e.g., seasonal changes in occupations, such as is likely to have been important in China in 1952 [2] [15, Chap. 3]. However, adopting wider sectoral classifications tends to obscure the very distinctions which are often considered important such as the distinction between a raw material and a made-up one.

To estimate labor incomes in yuan, we use an average figure of 200 yuan per worker, which is approximately that discovered in official household surveys of poor peasant households [3, Tables 9.2, 9.3]. This figure is a comparatively high one for two reasons: (1) it is an estimate of income per worker, not per head of the total population; (2) it is an estimate of monetary income plus income in kind. It is to be emphasized that our model is based on the assumption that all production is marketable, i.e., is potentially commodity production and hence can in total be accounted for at reigning market prices. There is therefore, no "subsistence sector" in the narrow sense of the term.

3. *Intermediate transactions*

These estimates are the most problematic since they are deduced in the main from indirect evidence rather than direct information on commodity flows. The various assumptions adopted are outlined in the notes to Appendix Table IV. In most cases, the proportionate size of the receiving department has been used as a proxy for its demand for deliveries from a particular subbranch. For agricultural products, we have used the information on disposal of production collated by Liu and Yeh, mainly from J. L. Buck's survey undertaken during the years 1929–33.

4. *Accounting for exports and imports*

The derivation of trade flows is relatively straightforward. As explained in Appendix Table III, the two sources of data are the official (State Statistical Bureau) figures and commodity breakdown of trade for 1952, combined with the commodity balance calculations undertaken by Liu and Yeh to estimate personal consumption. Having determined the total values of X_i for each department, it is necessary to adjust the gross commodity flows of Appendix Table IV to account for exports since as they stand these interdepartmental flows and incorporate flows of material production which actually went for export X_i rather than local production processes or local final consumption D_i. For our calculations, we assume the X_1 are deliveries to export that are destined for foreign department 1 production, i.e., they are previously included in $C_{11}{}^B$. Similarly for X_3, the component representing exports of mining products must be deducted from the gross flow $C_{31}{}^B$. The other component of X_3 is assumed to be destined for foreign department 2 production, i.e., is allowed for out of $C_{32}{}^B$. X_2 is assumed

TABLE I
ESTIMATES OF W_i

(1952 billion yuan)

Dept. 1	$W_1=$	C_{11}^{A+B}	$+C_{21}^{A+B}+$	C_{31}^{A+B}	$+ V_1+S_1$	
	$10.548=3.200+$	$(5.256-0.242)+$	$0 +$	$(1.785-0.243)$	$+ 0.635+S_1$	$\therefore S_1=0.157$
Dept. 2	$W_2=$	C_{12}^{A+B}	$+C_{22}^{A+B}+$	C_{32}^{A+B}	$+ V_2+S_2$	
	$53.564=$	3.795	$+6.158+0.200+$	$(20.023-0.139)$	$+20.790+S_2$	$\therefore S_2=2.737$
Dept. 3	$W_3=$	C_{13}^{A+B}	$+C_{23}^{A+B}+$	C_{33}^{A+B}	$+ V_3+S_3$	
	$45.586=$	1.036	$+ 0 +$	$(11.495-0.243)$	$+24.549+S_3$	$\therefore S_3=6.749$
	$\sum W_i=107.698$		$\sum_{i=1-3}^{j=1-3} \sum C_{ij}=52.081$		$\sum V_i=45.974$	$\sum S_i=9.643$

TABLE II
ESTIMATED VALUE OF r_i
(1952 billion yuan)

r_1	0.016
r_2	0.284
r_3	0.700
r_F	0.108

Sources: Table I and Appendix Table III.

to be already accounted for under deliveries to final demand and therefore no adjustment is necessary.

B. *Some Basic Results*

Tables I and II summarize our estimates of W_i, and its components and the indices of potentially reinvestable surpluses available from each department, including foreign credits from equations (10) and (10′) above.

From Tables I and II, and bearing in mind the full limitations of the data used we draw the following conclusions: (1) the raw material producing sector, department 1, represents by far the dominant source of potential savings for the development effort; (2) the evidence in Tables I and II reveals that, in quantitative terms, the Chinese development effort was to be dominantly *internally* financed, *even during its early phases.* Whether we take foreign savings contributed as represented by 1952 trade credits (as in Table II) or as an annual average Soviet and contribution of 0.300 billion yuan as implied in Mah's hypothesis noted above, we are forced to the same conclusion: It was the department producing agricultural and industrial raw materials which was most likely to have provided the greatest initial contribution to financing the development effort.

Overall, the ratio of aggregate surplus to "value added" ($\sum s+\sum v$) is 17.4 per cent and the ratio of $\sum C/\sum W$, i.e., the replacement requirement of fixed and circulating capital, amounts to an important 49.0 per cent. With these results in mind, we turn now to the need to clarify (1) the significance of the foreign sector in the achievement of the economy's reproduction and (2) Ishikawa's paradoxical finding concerning resource flow into the farming sector.

C. *An Application of the Model to the Problem of Net Resource Transfers*

1. *Simple reproduction, expanded reproduction, and the foreign sector*

According to the assumption of simple reproduction mere replacement of used-up capital is undertaken by the class disposing of the surplus: There is no net new accumulation and all surplus value is consumed. How far these assumptions appear to hold is found by calculating the market balance requirements (6) and (8) above. The results are as follows: For *consumer goods* (6) we estimate demand as

$$1.542(C_{31}^{A+B})+2.086(X_2)+0.382(X_3)+0.635(V_1)+0.157(S_1)=4.802\,,$$

and supply as

$$3.795(C_{12}^{A+B})+1.036(C_{13}^{A+B})+0.350(M_2)=5.181\,.$$

Similarly for (8) we have demand for *instruments of labor* as

$$3.795(C_{12}^{B})+1.036(C_{13}^{B})+0.242(X_1)=5.073\,,$$

and supply as

$$1.542(C_{31}^{A+B})+0.635(V_1)+0.157(S_1)=2.334\,.$$

Hence, ED_{2+3} is -0.379 and ED_1 is 2.739. The final balance expression (9) is therefore

$$2.739-0.379=ED^*=3.200+0.200-1.040=2.360\,. \qquad (11)$$

As expected, (6) and (8) do not hold and we find evidence that by 1952 the Chinese leaders had already brought about a reallocation of resources for a program of growth or expanded reproduction. In concrete terms, this reallocation implied an excess demand for producer goods of 2.7 billion yuan and a relatively small excess supply of consumer goods of 0.379 billion yuan. The resulting net excess demand (ED^*) was met by imports of 3.4 billion yuan from imports, but of these 2.36 (or approximately 70 per cent) were actually paid for, the rest being supplied by foreign credits.

In sum, from Appendix Table IIIC and the results summarized above, we conclude that the pattern of balance transfers which occurred at the start of the period of industrialization was as follows: (1) a shift in demand in favor of products of department 1, accompanied by an excess supply of articles of consumption; (2) two thirds of the cost of importation of extra deliveries (for expanded reproduction) into department 1 was paid by exports of department 2, one third by aid and the other minor exports of departments 1 and 3; but (3) although the export surplus appears to be earned by department 2, as is seen from Table I, its basis is in materials drawn from other departments, especially department 3. Our results support, therefore, the traditional view of the vital role played by agriculture at early stages of modern industrial development. This leads us to reconsider the challenge laid to such a view by Professor Ishikawa.

2. *Reinterpreting Ishikawa's findings on "net resource flow"*

Professor Ishikawa's position and his research results may be summarized in

the following propositions. The traditional view which suggests that the major source of funds or surplus for financing economic development must be the agricultural sector needs to be reconsidered in light of the heavy needs of this sector itself for development funds [15, p. 291–94]. The empirical evidence regarding net resource flow, specifically in the Chinese case, does not substantiate the view that the "farm sector" provided an export surplus at the critical early stages of the modern industrialization. Rather the prevailing situation was one of a net *inflow* [15, Table 4.1]. In sum, therefore, Ishikawa concludes that the agricultural sector cannot be counted upon as having been a net source of capital in the early stages of "contemporary" Asian development [5, p. 241].

We do not in any way dispute the correctness of Ishikawa's conclusion regarding the prime importance of agricultural development in any overall planning strategy. However, we would point out that Ishikawa's evidence on net resource flows is not inconsistent with the traditional view of the predominant importance of an agricultural *surplus* in financing economic development, a view which has been given a degree of extra support from our own findings in this paper. Rather, the problem in interpreting Ishikawa's results arises because they are not related in a methodological or conceptual way to a theory of surplus or unequal exchange. Referring back to our discussion of Section I above, we can see that if prices are higher than values in the nonagricultural sector but less than values in the agricultural sector, then exchange flows could show a negative agricultural export surplus, but this would still be compatible with a transfer of value *out* of agriculture to form the basis of capital accumulation. A simple example will illustrate this point.

	Agriculture	Nonagriculture	Unequal Exchange
(a) Value level	$V_A=C_A+V_A+S_A=4$	$V_{NA}=C_{NA}+V_{NA}+S_{NA}=2$	Yes: $4-2=2$
(b) Price level (1)	$P_A=2$	$P_{NA}=3$	*Negative* export surplus of agriculture $(2-3)$
(c) Price level (2)	$P_A=3$	$P_{NA}=2.5$	*Positive* export surplus of agriculture $(3-2.5)$

In the first comparison, lines (a) and (b), the (P/V) ratios are 0.5 and 1.5 respectively resulting in a paradoxically negative contribution of agriculture, viewed from the level of exchange. But in line (c) the "expected" result occurs, given the particular (P/V) ratios (0.75, 1.25) chosen.

In sum, resource flows cannot by themselves indicate anything about the degree to which a surplus exists, nor the extent to which it contributes funds for industrialization, because a flow of resources approach is not based on a comparison of the amount produced by an economic system in excess of the total direct and indirect input requirements necessary for that system's own reproduction, i.e., its surplus, in modern Straffa-Leontief terms. Only if Ishikawa had adopted a model which analyzed the formation of a surplus could he have overcome the problem of deciding whether both *tax* payments and *sales* of agricultural com-

modities should be included under the heading "exports of farm produce" [15, p. 310] [16, p. 10]. As previously pointed out only the former is unambiguously part of a surplus and represents funds available for industrialization.

Assuming our results in Table II are a fair reflection of the interdepartmental *distribution* aggregate surplus value, then the essential *consistency* between a net import of resources by the agricultural sector and the dominant role of this sector in providing capital for development can be seen as follows. On a flow of funds approach, the net resource flow R out of agriculture is given by

$$R=E-M, \tag{12}$$

where E and M represent the money value of flows of physical commodities either exported E or imported M by the agricultural sector. For our application, we shall use department 3 to represent the agricultural sector and disaggregate E and M as follows,

$$E_3=C_{31}{}^{B}+C_{32}{}^{B}+Y_3+X_3, \tag{13}$$

$$M_3=C_{13}{}^{A+B}+F_{23}+NF_{23}+\lambda_3 M_2+M_3. \tag{14}$$

Where λ_3 is the proportionate weight of demand for available supplies of articles of consumption by workers and unproductive classes of department 3; Y_3 represents deliveries of department 3's production to final demand in departments 1 and 2; and F_{23}, NF_{23} are imports into 3 of food and nonfood articles of consumption from department 2. In both expression (13) and (14), the resource flow comprises three elements: (1) an intermediate delivery to other departments for use in their production processes; (2) a delivery to final demand *within* China; (3) a delivery or receipt of commodities from the rest of the world.

In the estimates which follow λ_3 is represented by the relative magnitude of department 3 in total income, i.e., by the ratio:

$$\frac{V_3+S_3}{\sum V_i+\sum S_i}=\frac{31.298}{55.617} \quad \text{or} \quad 0.562.$$

Y_3, F_{23}, NF_{23} are calculated as follows. Y_3: the deliveries to final demand outside department 3 equal total deliveries to final demand of department 3 less retention for final demand within department 3 itself. From Appendix Table I we identify which sectors of department 3 deliver to final demand V and from Appendix Table IV we can calculate these deliveries as a residual after intermediate deliveries. So, for group 300d, "potatoes," deliveries to final demand are (2.99 minus 0.987) or 2.003. In aggregate, such deliveries of department 3 to final demand total 9.284. So, using λ_3 as the proportionate weight in final demand of department 3 itself, exports to final demand of department 3, Y_3, are:

$$Y_3=(1-\lambda_3)9.284=4.059. \tag{15}$$

F_{23}: From other research [22, Table 10], we know total expenditure on food to be 33.08 in 1952. Of this we are left, after deduction of food contributed by department 3 to final demand, with 23.796 (33.08 minus 9.284). Allocating this as before in proportion to aggregate incomes gives F_{23} as 13.373. NF_{23}: Total

expenditure on nonfood items in department 3 is given from the balance equation,

$$NF_{23} = \text{Income minus final expenditure on food in department 3, minus expenditure on food from department 2}$$
$$= 31.298 - 5.225 - 13.373 = 12.700 .$$

Putting together these estimates with those already derived, we can estimate the net resource flow of department 3 in 1952 as follows:

$$R_3 = (1.785 + 20.023 + 4.059 + 0.382) - (1.036 + 13.373 + 12.700 + 0.199)$$
$$= -1.059 . \qquad (16)$$

In agreement with Ishikawa, we estimate in fact, a net resource transfer *into* the "farm sector" in China in 1952 posing what would appear to be a challenge to the traditional view regarding the role of an agricultural surplus. But, in fact, this result only obscures the existence of that surplus and is entirely consistent, as can be seen by reconsidering the estimates of Table II, with the possibility of a development strategy financed predominantly by agricultural "savings."

We would reemphasize that our criticism does nothing to mitigate the importance of Professor Ishikawa's conclusion regarding the need to modernize the farm sector itself to bring about a successful development experience. However, only by viewing the problem in terms of a general equilibrium model is it possible to realize the interdependent roles played by all departments and all classes in an economic system. Consequently, the problem of developing one department is seen as inextricably tied to the ability of the others to help that development to be realized.

Lastly, we would point out that our results refer to 1952 only, consequently, they do not enable us to comment directly on possible *changes* in the sources of capital accumulation during the early period of industrialization. In the Russian case, the recent evidence seems to suggest that whatever the initial situation, the weight of financing was quickly taken over by the shoulders of the industrial working class (Barsov) [11, p. 854–61]. We can only surmise that in light of the failure of the marketable ratio of foodgrain in China to grow over the period 1952–57 [24, Table 1] similar tendencies were probably at work in the Chinese case.

V. THE DEBATE OVER CHINA'S PAST: DISTRIBUTIONIST VERSUS TECHNOLOGICAL EXPLANATIONS

Our approach enables us to comment on the current debate between two competing schools of thought concerning the reasons for China's economic backwardness in the twentieth century. As outlined by Riskin [35, pp. 56–64], the distributionist school of thought emphasizes distribution to agents or classes over production, technology or markets. Their vision is one of essentially exploitative rural conditions of prerevolutionary China with various parasitic classes milking a substantial surplus from the rural economy, a surplus used "unproductively"

for personal aggrandizement. Such an institutional background provides, for this school, the dominant reasons for China's relative backwardness. The technological school emphasizes production before distribution and uses the model of a "high-level equilibrium trap" in which it is argued that "by the late nineteenth and early twentieth centuries there was no longer any significant economic surplus above subsistence being produced by the overwhelming rural component of the Chinese economy" [15, p. 61]. China's backwardness is explained in terms of its failure to introduce modern technology and combat the law of diminishing returns in traditional agriculture.

Our empirical results certainly support the arguments of the distributionist school of thought. Although the calculations of the magnitude of the surplus by Riskin are not directly comparable with ours, it is hardly necessary to reiterate that in both our results and Riskin's, a surplus of considerable magnitude can be found to exist. Moreover, the composition of the actually produced surplus is virtually identical. In Riskin's results, "of the actually produced potential surplus... about 70 per cent originated in agriculture and 30 per cent in the non-agricultural sectors" [35, p. 75]. These results accord very closely with those summarized in Table II above where we calculate, also, a 70 per cent contribution made by department 3. Where we do differ from the distributionist school is in our adoption of a general equilibrium approach which takes account not just of distribution, but of production (prior to distribution), consumption and exchange.

By identifying the surplus from the perspective of distribution, the distributionist school, including Riskin, is vulnerable to the standard criticisms levied against this branch of political economy ever since Ricardo made its focus that of "the laws regulating the distribution of the produce of the earth." The standard criticism is simply that there is no reason why distribution of a fixed amount of production should have a stronger power of explanation than say production conditions themselves, or conditions associated with marketing (realization) or exchange of that production. The distributionist approach leaves in the air the vital questions of how their surplus is realized, how it is recirculated and how it is reproduced. Moreover, writers of this school cannot satisfactorily take account of that part of total product/income which is necessary for replacing used up capital—calculated as an impressive 50 per cent of the total in our estimates for China in 1952. In sum, they do not understand the theory of the surplus with which they are dealing [7] [29, p. 553].

It is in this respect that the general equilibrium approach in stressing all three sides of the problem (production, distribution, and exchange) essentially accommodates the arguments of the technological school which, in emphasizing production at the expense of other aspects, is subject to a similar criticism as that levied against the distributionist approach.

The weakness of the technological explanation which stresses "the exhaustion of opportunities for increasing farm productivity" is seen clearly when a general equilibrium approach is adopted. In a capitalist economy there cannot be, over any lengthy period of time, a situation of fundamentally divergent rates of profit

across different sectors or departments, for such divergencies will be broken down by the mobility of capital. Hence a situation of a zero surplus/zero profit agriculture as envisaged by this school (Dernberger [6, p. 24]) in association with a relatively dynamic "new economy," not solely owned by foreign capital but also Chinese merchant comprador classes, which was likely to be highly profitable, is an inconsistency. So the only way, the technological school can retain a consistent argument when faced with the "facts" about the existence of a substantial rural surplus is to emphasize the *barriers* to the mobility of capital between departments. But the effective maintenance of restrictions against such movement flies in the face of (1) their assessment of the positive role played by *nascent* entrepreneurial Chinese capitalists in twentieth century industrialization [6, pp. 30–47], (2) the collapse of the political superstructure (variously emphasized, e.g., by [35, p. 84] [32, p. 123] [10, p. 20]).

In sum, there is no strong case for ascribing causality to one factor in preference to another; each explanation has its contradictions. There is a stronger case for viewing the problem in its totality, i.e., from its abstract general form initially, and from there moving towards the more concrete appraisal of events and policies only after the general abstraction has been satisfactorily established. A simple example illustrates this point.

The impact of foreign capital on the Chinese textile industry will be appraised very differently in the model of Section III above from one which, as in the crude approach by so-called "Marxists," fails to make such abstructions. From the general equilibrium model, the various linkages are established and the appreciation of the foreigner's role will be very different according to whether it involves shifts in parameters in department 1 (imported spinning technology), department 2 (imports of cotton textiles for final demand), or department 3 (new supplies of raw materials) and whether it caters for mass consumption V or luxury consumption S.

CONCLUSION

This paper represents an attempt to reanalize certain substantial issues in Chinese development experience. Although our main contribution has been to reinforce the orthodox view concerning the role of "agriculture" in economic development, we would suggest that our approach represents an advance in terms of realism and also enables us to clarify some apparent contradictions in the literature. Finally, we have shown how it can in essence be applied to reappraising the longer run experience of Chinese economic history and gives a different perspective on this debate in the literature.

In sum, our conclusion is that by viewing the Chinese economy as a complex set of interrelationships, any explanation failing to make the necessary abstractions is likely to be facile and in essence, misleading.

REFERENCES

1. BRETH, R. M. *Mao's China: A Study of Socialist Economic Development* (Melbourne: Longman Cheshire, 1977).
2. BUCK, J. L. *Land Utilisation in China* (Chicago: University of Chicago Press, 1937).
3. CHEN, N. R. *Chinese Economic Statistics* (Chicago: Aldine Publishing Co., 1966).
4. CHEN, N. R., and GALENSON, W. *The Chinese Economy under Communism* (Chicago: Aldine Publishing Co., 1969).
5. COWNIE, J. "Economic Development in Asian Perspective: A Review Article," *Developing Economies,* Vol. 6, No. 2 (June 1968).
6. DERNBERGER, R. "The Role of the Foreigner in China's Economic Development, 1846–1949," in *China's Modern Economy in Historical Perspective,* ed. D. H. Perkins (Stanford: Stanford University Press, 1975).
7. DE QUINCEY. *The Logic of Political Economy* (Edinburgh, 1844).
8. ECKSTEIN, A. *Communist China's Economic Growth and Foreign Trade* (New York: McGraw-Hill, 1966).
9. ————. "The Economic Heritage" in *Economic Trends in Communist China,* ed. A. Eckstein, W. Galenson, and T. C. Liu (Chicago: Aldine Publishing Co., 1968).
10. ————. *China's Economic Revolution* (Cambridge: Cambridge University Press, 1977).
11. ELLMAN, M. "Did the Agricultural Surplus Provide the Resources for the Increase in Investment in the USSR during the FFYP," *Economic Journal,* Vol. 85, No. 340 (December 1975).
12. FEI, J. C. "The 'Standard Market' of Traditional China," in *China's Modern Economy in Historical Perspective,* ed. D. Perkins (Stanford: Stanford University Press, 1957).
13. GRAY, J. "The Chinese Model: Some Characteristics of Maoist Policies for Social Change and Economic Growth," *L'Est,* Milan No. 2 (1971). Reprinted in *Socailst Economics,* eds. A. Nove and D. Nuti (Penguin Modern Economics, 1972).
14. GREGORY, P., and STUART, R. C. *Soviet Economic Structure and Performance* (New York: Harper & Row, 1974).
15. ISHIKAWA, S. *Economic Development in Asian Perspective* (Tokyo: Kinokuniya Bookstore, Co., 1967).
16. ————. "Resource Flow between Agriculture and Industry: The Chinese Experience," *Developing Economies,* Vol. 5, No. 1 (March 1967).
17. JOHNSTON, B. F., and MELLOR, R. W. "The Role of Agriculture in Economic Development," *American Economic Review,* Vol. 5, No. 4 (September 1961).
18. JORGENSON, D. "The Development of a Dual Economy," *Economic Journal,* Vol. 71, No. 282 (June 1961).
19. KOSHIMURA, S. *Theory of Capital Reproduction and Accumulation,* ed. J. G. Schwarz (Ontario: DPG Publishing Co., 1975).
20. LEWIS, A. "Economic Development with Unlimited Supplies of Labour," *Manchester School of Economic and Social Studies,* Vol. 22 (1954).
21. LEONTIEF, W. *The Structure of the American Economy* (Cambridge, Mass.: Harvard University Press, 1941).
22. LI FU-CHEN. *Report on the First Five Year Plan* (Peking, 1955).
23. LIU, T. C., and YEH, K. C. *The Economy of the Chinese Mainland: National Income and Economic Development, 1933–1959.* (Princeton, N.J.: Princeton University Press, 1965).
24. MACRAE, J. "Mobilization of the Agricultural Surplus in China for Rapid Economic Development, 1952–1957," *Developing Economies,* Vol. 8, No. 1 (Macrh 1970).
25. MAH, F. H. "The First Five Year Plan and Its International Aspects," in *Three Essays on the International Economics of Communist China,* ed. C. F. Remer (Ann Arbor: University of Michigan, 1959).
26. MAO TSE-TUNG. *Selected Readings* (Peking: Foreign Languages Press, 1971).

27. MARX, K. *Capital,* Vol. 2, ed. F. Engels (London: Lawrence and Wishart, 1967).
28. ————. *Capital,* Vol. 3, ed. F. Engels (London: Lawrence and Wishart, 1971).
29. ————. *Grundrisse: Foundations of the Critique of Political Economy,* trans. with a foreword by M. Nicolaus (Penguin Books ,1973).
30. OHKAWA, K., and ROSOVSKY, H. "The Role of Agriculture in Modern Japanese Economic Development," *Economic Development and Cultural Change,* Vol. 9, Part 1 (1960/61).
31. PERKINS, D. *Market Control and Planning in Communist China* (Cambridge, Mass.: Harvard University Press, 1966).
32. ————. "Growth and Changing Structure of China's Twentieth-Century Economy," in *China's Modern Economy in Historical Perspective,* ed. D. H. Perkins (Stanford: Stanford University Press, 1975).
33. PREOBHAZHENSKY, E. *The New Economics* (Oxford: Clarendon Press, 1965). Originally published in Moscow, 1926.
34. RISKIN, C. "Maoism and Motivation: Work Incentives in China," *Bulletin of Concerned Asian Scholars,* Vol. 5, No. 1 (July 1973).
35. ————. "Surplus and Stagnation in Modern China," in *China's Modern Economy in Historical Perspective,* ed. D. H. Perkins (Stanford: Stanford University Press, 1975).
36. SETON, F. "The Transformation Problem," *Review of Economic Studies,* Vol. 24 (1957).
37. SRAFFA, P. *Production of Commodities by Means of Commodities* (Cambridge: Cambridge University Press, 1960).
38. WHEELWRIGHT, E. L., and MCFARLANE, B. *The Chinese Road to Socialism* (New York: Monthly Review Press, 1970).
39. YEH, K. C. "Capital Formation," in *Economic Trends in Communist China,* ed. A. Eckstein, W. Galenson, and T. C. Liu (Chicago: Aldine Publishing Co., 1968).

APPENDIX TABLE I

COMPOSITION OF W_j VALUES IN 1952 BILLION YUAN

A. Instruments of Labor and Their Auxiliaries ($j=1$)

	Code	Category	Value of Production	Assumed Delivered to:
Factory sector: identified (1)	100	Pig iron	0.380	11 (i.e., part of C_{11})
	101	Steel/rolled steel	2.121	11
	102	Cement	0.243	11/12/13
	103	Sheet glass	0.063	11/12/13
	104	Other construction materials	0.315	11/12/13
	105	Coke	0.126	11
	106	Paper	0.655	11/12/13/V*
	107	Chemicals	0.298	11
	108	Gunny sacks	0.135	11/12/13
	109	Auto tyres	0.164	11/12
	110	Machinery	1.401	11/12/13
			$\Sigma=5.901$	
Utilities (2)	111	Electricity	0.435	11/12/13/V
	112	Gas	0.027	11/12/13/V
	113	Water	0.070	11/12/13/V
			$\Sigma=0.532$	
Factory sector: unidentified (3)	120	Lumber, metal products, etc.	$\Sigma=1.370$	11/12
Transport and communications (4)	130	Freight transport	1.103	11
	131	Old fashioned transport	0.053	11
	132	Communications	0.093	11
			$\Sigma=1.249$	
Handicrafts: identified (5)	140	Pig iron	0.006	11
	141	Paper	0.109	11/12/13/V
			$\Sigma=0.115$	
Handicrafts: unidentified (6)	150	Unidentified handicraft producer goods	$\Sigma=1.381$	11/12/13
Estimated total value of production $W_1=10.548$				

B. Articles of Consumption and Their Auxiliaries (j=2)

	Code	Category	Value of Production	Assumed Delivered to:
Factory sector: identified (1)	200	Cotton yarn	2.605	22
	201	Cotton cloth	2.365	V
	202	Silk	0.199	V
	203	Silk piece goods	0.116	V
	204	Woolen textiles	0.157	V
	205	Glass cloth	0.002	V
	206	Clothing (knitted goods)	0.084	V
	207	Sugar	0.274	V
	208	Milled rice	0.310	V
	209	Wheat flour	0.927	V
	210	Edible vegetable oils	0.360	V
	211	Cigarettes	1.298	V
	212	Matches	0.109	V
	213	Rubber footwear	0.247	V
			Σ=9.054	
Factory sector: unidentified (3)	220	Wood products, appliances, etc.	Σ=1.410	V
Transport and communications (4)	230a	Freight transport	1.482	22
	230b	Passenger transport	0.510	V
	231	Old fashioned transport	1.438	22
	232	Communications	0.125	22
			Σ=3.555	
Handicrafts: identified (7)	240	Milled rice	7.621	V
	241	Wheat flour	2.558	V
	242	Tea	0.110	V
	243	Sugar	0.071	V
	244	Soya bean sauce	0.256	V
	245	Wine and liquor	0.162	V
	246	Cotton yarn	0.508	22
	247	Cotton cloth	1.280	V
	248	Silk piece goods	0.078	V
	249	Edible vegetable oils	0.669	V
			Σ=13.313	
Handicrafts: unidentified (6)	250	Unidentified handicraft production	Σ=26.232	V
Estimated total value of production W_2=53.564				

C. Raw Materials of Labor and Articles of Raw Consumption ($j=3$)

	Code	Category	Value of Production		Assumed Delivered to:
Agriculture	300	Food crops (8)	21.63		
of which:	300a	Paddy rice	8.28		32/33
	300b	Wheat	3.33		32/33
	300c	Miscellaneous	7.04		32/33
	300d	Potatoes	2.99		33/*V*
	301	Soya beans	1.330		32/33/*V*
	302	Oil bearing crops	1.030		32/33
of which:	302a	Peanuts	0.49		32/33
	302b	Rapeseed	0.20		32/33
	302c	Sesame	0.15		32/33
	302d	Cotton seed	0.19		32/33
	303	Plant fibers	2.620		32/33
of which:	303a	Cotton	2.22		32/33
	303b	Hemp	0.40		32/33
	304	Other industrial crops	0.670		32/33
of which:	304a	Sugar cane	0.14		32/33
	304b	Sugar beets	0.02		32/33
	304c	Tobacco	0.39		32/33
	304d	Tea	0.11		32/33
	305	Vegetables	1.310		*V*
	306	Fruits	0.980		*V*
	307	Animal products†	6.110		33/32/*V*
	308	Forest products	1.190		31
	309	Fishery products	0.630		*V*
	310	Miscellaneous	2.180		32/*V*
			$\Sigma=39.680$		
Mining—modern (a)			(a)+(b)	Total	
plus handicraft	311	Coal	0.790+0.040	0.830	31/32/*V*
(b)—(9)	312	Oil	0.070	0.070	31
	313	Ores	0.090	0.090	31
	314	Limestone	0.100	0.100	31
	315	Salt	0.610+0.260	0.870	*V*
	316	Miscellaneous	0.220	0.220	31
			$\Sigma=1.870+0.300$	$\Sigma=2.170$	
Transport and	330	Freight transport	0.265		33
communications (4)	331	Old fashioned transport	1.449		33
	332	Communications	0.022		33
			$\Sigma=1.736$		
Estimated total value of production $W_3=43.586$					

Note:

(1) [23, Table 39].

(2) [23, Table H–4].

(3) [23, p. 149]. "Unidentified" refers here to those factory products identified as produced in 1933 but for which no detailed 1952 information is available.

(4) [23, Table H–9]. Aggregate receipts for modern freight transport and communications are distributed across departments in proportion to the value of total factory production in each department. Old fashioned transport is allocated in

proportion to total handicraft and farm production. Passenger transport is of course allocated to department 2.

Calculation of weights w_i for allocating freight transport and communications: Factory output including utilities,

$$W_1 = 5.901 + 0.532 + 1.370 = 7.803$$
$$W_2 = 9.054 + 1.410 = 10.464$$
$$W_3 = 1.870 = 1.870$$
$$\Sigma = 20.137.$$

Therefore, $w_1 = 0.387$, $w_2 = 0.520$, $w_3 = 0.093$.

Weights for allocating old fashioned transport: Handicraft and farm output

$$W_1 = 0.115 + 1.381 = 1.496$$
$$W_2 = 13.313 + 26.232 = 39.545$$
$$W_3 = 39.680 + 0.300 = 39.980$$
$$\Sigma = 81.021.$$

Therefore, $w_1 = 0.018$, $w_2 = 0.489$, $w_3 = 0.493$.

(5) [23, Table 4, pp. 547, 552].

(6) The gross value of production is derived by assuming that the ratios between producer goods and consumer goods and between gross output and gross value added are the same in the unidentified sector in 1952 as in the identified sector in 1933. See [23, Tables 44, 45, 46]. So, the figure 1.381 in the table for W_1 is derived as 5 per cent of

$$3.27 \times 11.28/1.35, \text{ plus } 3.27/4.72 \times 0.42$$

to allow for depreciation. A similar calculation gives the figure for unidentified department 2 handicrafts.

(7) [23, pp. 538–52].

(8) [23, TableE–1, pp. 395–419].

(9) [23, Table H–2].

* V here stands for final demand.

† See Appendix Table IV notes (4) and (5).

APPENDIX TABLE II

PRODUCTIVE EMPLOYMENT AND LABOR INCOMES V_i BY DEPARTMENTS (1952)

A. Employment (Millions)

$j=1$		$j=2$		$j=3$	
		Joint agricultural and subsidiary occupations*	84.019	Agriculture only*	115.87*
Factories	0.840	Factories	1.208		
Handicrafts	0.486	Handicrafts	13.014	Mining	1.411
Utilities	0.081				
Transport/communication	0.283	Transport/communication	0.379	Transport/communication	0.068
Old fashioned transport	0.196	Old fashioned transport	5.330	Old fashioned transport	5.374
Construction	1.290				
	3.176		103.95		122.724
				Total	$\Sigma=229.85$

B. Labor Incomes

	Dept. 1	Dept. 2	Dept. 3
At 200 yuan	$V_1=0.635$	$V_2=20.790$	$V_3=24.549$
		Total	$\Sigma=45.974$

Sources: For "employment," [22, Table 11, 54, H–3, p. 586] and Appendix Table I.

* Assuming the same proportion as in 1933 (42.0 per cent) between workers in agriculture and in agricultural side occupations. See Liu and Yeh [23, Table 54].

APPENDIX TABLE III

ESTIMATES OF IMPORTS AND EXPORTS BY DEPARTMENT

A.

Exports		Imports	
Industrial and mining products	0.485	Producer goods	3.400
Processed products of agriculture and side occupations	0.618	Consumer goods	0.350
Products of agriculture and subsidiary occupations	1.607		
Total	2.710		3.750

Source: [3, Table 81].

Note: According to the State Statistical Bureau, the above and following commodity composition of trade pertained in 1952. All figures are in billion 1952 yuan.

It is reasonable to assume that all "producer goods" imports were deliveries for servicing production either in the "producer goods" department, i.e., are part of $C_{11}{}^{A}$ or are raw materials for department 2, i.e., part of $C_{32}{}^{A}$ (e.g., raw cotton). Also, we assume consumer goods imports arrive processed for final consumption, i.e., are included under M_2.

Regarding exports, we assume 50 per cent of 0.485 are from mining, the rest are assumed to be exported from department 1.

Allocating the two agricultural export totals is more problematic. The only other information we know of defining the commodity composition of exports in 1952 is given by Liu and Yeh [23, p. 249]. Liu and Yeh gives the following breakdown:

B.

Product	Exports	Imports
Processed food products	1.489	0.129
Clothing and related processed materials	0.329	0.069
Raw cotton and miscellaneous, manily raw materials	0.121	0.200
Total	1.939	0.398

Source: [23, Tables 24, 91].

This leaves 0.286 as miscellaneous exports of all agricultural products (2.225–1.939) to be allocated. We assume these are distributed between departments 2 and 3 in the same way as the identified export commodities in Appendix Table IIIB. Consequently, we derive our final composition of exports and imports classified for present needs by three departments as:

C.

	Exports		Imports	
$j=1$	X_1	0.242	$C_{11}{}^{A}$	3.200
$j=2$	X_2	1.489+0.329+0.268=2.086	M_2	0.350
$j=3$	X_3	0.243+0.121+0.018=0.382	M_3	—
			$C_{32}{}^{A}$	0.200

APPENDIX TABLE IV

DEVIATION OF C_{ij} VALUES

C_{11}^A	C_{11}^B		C_{21}^A	C_{21}^B	C_{31}^A	C_{31}^B	
Code Value	Code	Value				Code	Value
3.200						308	1.190
	100	0.380				311 (6)	0.125
	101	2.121	nil	n.a.	nil	312	0.070
	102 (1)	0.025				313	0.090
	103 (1)	0.006				314	0.100
	104 (1)	0.032				316	0.210
	105	0.126					
	106 (8)	0.046					
	107	0.298					
	108 (1)	0.014					
	109 (2)	0.027					
	110 (9)	0.479					
	111, 112, 113 (7)	0.072					
	120 (2)	0.226					
	130, 131, 132	1.249					
	140	0.006					
	141 (8)	0.008					
	150 (1)	0.141					
Σ=3.200	Σ=5.256		—	—	—		Σ=1.785

C_{12}^A	C_{12}^B		C_{22}^A	C_{22}^B		C_{32}^A	C_{32}^B	
	Code	Value		Code	Value		Code	Value
	102 (1)	0.125						
nil	103 (1)	0.032	nil	200	2.605	0.200	300a (3)	7.452
	104 (1)	0.162		230a	1.482		300b	2.797
	106 (8)	0.234		231	1.438		300c	4.224
	108 (1)	0.070		232	0.125		300d	—
	109 (2)	0.137		246	0.508		301	0.465
	110 (9)	0.774					302a	0.431
	111, 112, 113 (7)	0.365					302b	0.194
							302c	0.124
							302d (4)	0.159
	120 (2)	1.144					303a	2.220
	141 (8)	0.039					303b	0.400
	150 (1)	0.713					304a	0.102
							304b	0.019
							304c	0.390
							304d	—
							307 (5)	0.391
							310 (5)	0.480
							310 (6)	0.175
	Σ=3.795			Σ=6.158			Σ=20.023	

C_{13}^A	C_{13}^B Code		C_{13}^B Value	C_{23}^A	C_{23}^B	C_{33}^A	C_{33}^B Code		C_{33}^B Value
	102	(1)	0.093				300a	(3)	0.828
	106	(8)	0.173				300b		0.533
nil	108	(1)	0.051	nil	nil	nil	300c		2.816
	110	(9)	0.148				300d		0.987
	111						301		0.066
	112	(7)	0.015				302a		0.059
	113						302b		0.006
	141	(8)	0.029				302c		0.025
	150	(1)	0.527				302d		0.030
							303a		—
							303b	(4)	—
							304a		0.038
							304b		0.001
							304c		—
							304d		—
							305		0.065
							306		—
							307	(5)	4.305
							308	(4)	—
							309	(4)	—
							310	(5)	—
							330		
							331		1.736
							332		
—	Σ=1.036			—	—	—	Σ=11.495		

Note: The allocations of W_i for interdepartmental transactions, results in the above compositions of C_{ij}. All figures are in billion 1952 yuan.

(1) The weights for allocating the aggregate values of including production across departments are the relative aggregate values of each department's production in the total as derived in Appendix Table I.

(2) The weights are given by $W_1/(W_1+W_2)$ and $W_2/(W_1+W_2)$, i.e., 0.165 and 0.835.

(3) Rice production used internally for feed and animal consumption is assumed to be 10 per cent. The rest therefore is sold to department 2 for processing for human consumption [23, Table 80].

(4) What used for nonfood purposes (seed, feed requiremenst, etc.) is estimated at 16 per cent of gross production. We assume therefore that 84 per cent of 3.33 represents deliveries to department 2 for milling [23, p. 540]. Similarly, figures for deliveries to department 2 of other products of department 3 are assumed to be as follows:

		Per Cent of Total Production Delivered to Department 2	Per Cent Absorbed Internally
Crop	Potatoes	—	33
	Miscellaneous food crops	60	40
	Soya beans	35	5
	Oil bearing crops:		
	Peanuts	88	12
	Rapeseed	97	3
	Sesame	83	17

	Cotton seed	84	16
	Plant fibers:		
	Cotton	100	—
	Hemp	100	—
	Other industrial crops:		
	Sugar cane	73	27
	Sugar best	95	5
	Tobacco	100	0
	Tea	0	0
	Vegetables	0	5
	Fruits	0	0
	Fishery products	0	0
Animal products	Cattle	10	*
	Horses	0	
	Mules	0	
	Donkeys	0	
	Sheep and goats	10	
	Hogs	2	
	Chickens	0	
	Ducks	0	
	Geese	0	
	Eggs	0	
	Wool	100	
	Silkworm cocoons	100	
	Miscellaneous	22	

Source: [23, Table 80].

* See note (5) below.

(5) The calculation of internal absorption $C_{33}{}^{B}$ for animal products is as follows.

The rate of utilization μ_i *of* animal product group i is given in [23, Table A–12]. So the value of product group i utilized V_i is:

$$V_i=\mu_i S_i,$$

where S_i is the value of the livestock of group i. The requirement for regenerating a unit of livestock is therefore given by $(1-\mu_i)$. Our estimate for group i of the value of production which goes to make up C_{33}, i.e., internal absorption of livestock group i, X_i is therefore given by

The actual numbers are as follows:

$$X_i=(1-\mu_i)S_i$$
$$=(1-\mu_i)V_i/\mu_i.$$

Code	Group i	Value Delivered to Department 2	V_i: Value Utilized or Produced	$\frac{1-\mu_i}{\mu_i}$	Absorbed Internally $X_i=\frac{1-\mu_i}{\mu_i}V_i$
307a	Cattle	0.045	0.450	5.6	2.550
307b	Horses		0.030	9.0	0.270
307c	Mules		0.010	9.0	0.090
307d	Donkeys		0.030	9.0	0.270
307e	Sheep/goats	0.020	0.200	1.5	0.300
307f	Hogs	0.066	3.300	0.25	0.825
307g	Chickens		0.290	0	0

307h	Ducks		0.080	0	0
307i	Geese		0.030	0	0
Others:					
307j	Eggs		0.470	n.a.	n.a.
307k	Wool	0.130	0.130	n.a.	n.a.
307l	Silkworm cocoons	0.130	0.130	n.a.	n.a.
Total (307) groups:		0.391	5.16	—	4.305
310	Miscellaneous	0.480	2.180	n.a.	0

Sources: Note (4) above and [23, Tables A–12, E–2].

Note: Totals are rounded.

(6) Allocation of coal is as follows. The average expenditure per worker on fuel is 6.8 yuan [3, p. 433]. Assuming a third of this is on coal [23, p. 636] and that the total number of productive workers is 229.85 million (Appendix Table IIB.) then total final expenditure on coal is 528.65 million yuan. Allocating the remainder (0.301) according to the aggregate values of nonhandicraft production in departments 1 and 2 gives the figures in the table.

(7) We assume electricity to be representative of all three utilities. According to surveys [3, Tables 4.6, 4.122] electricity delivered to final users accounts for about 15 per cent of total production. 85 per cent of 0.532 is therefore allocated in proportion to aggregate outputs, W_1 and W_2, of departments 1 and 2, and mining output of department 3, i.e., 10.548, 53.564, 2.170.

(8) The weights are the aggregate output and value of final demand by productive workers as given in Appendix Table II.

(9) Allocated in proportion to aggregate "modern sector" outputs, i.e., excluding handicrafts, old fashioned transport and agriculture. The relevant output totals are therefore 7.729, 12.729, and 2.457.