WP- 773

The Estimation of Gross Domestic Product
and Its Growth Rate for the German Democratic Republic

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NOV, 1985

WORLD BANK STAFF WORKING PAPERS
Number 773

A Background Study
for
Dollar GNPs of the U.S.S.R. and Eastern Europe

The Estimation of Gross Domestic Product and Its Growth Rate for the German Democratic Republic

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FOREWORD

Centrally planned economies (CPEs) account for a significant share of the world's production and income. In view of their importance in the world economy, and to facilitate international comparative analysis, for many years the World Bank has included statistical data on these countries in those of its publications that aim for universal coverage, such as The World Bank Atlas. Among these data, those relating to gross national product (GNP) and to GNP per capita are the most important, and the Bank also needs them for operational purposes for its member countries, which now include some CPEs.

In the CPEs prices are generally set administratively and are often loosely or not at all related to the relative scarcity and costs of production of goods and services. This is particularly true of the exchange rate. The World Bank normally uses exchange rates for converting GNP figures from national currencies into dollars (or into any other numeraire), an indispensable step for international comparisons. The choice of an appropriate conversion factor therefore poses particularly difficult problems for most CPEs. A further difficulty arises because the national accounts of the CPEs are based on the concept of net material product (NMP), which differs from the concept of GNP used in market economies. To derive the GNP numbers of those CPEs that compile only NMP accounts, various adjustments must be made. The data required for making these adjustments are not always fully available. Finally, a separate set of issues arises in relation to year to year comparisons within the same CPE. For these too and the corresponding growth rates, official data are not strictly comparable to growth rates of the market economies.

In early 1982 a research project sponsored and financed by the World Bank was undertaken to assess alternative methods of computing the per capita dollar GNP levels and growth rates of CPEs. It covered eight countries: Bulgaria, Cuba, Czechoslovakia, the German Democratic Republic, Hungary, Poland, Romania and the U.S.S.R. The purpose of this research project was to define the best among known methods that could be applied to CPEs as a group and make use of available data. It was not its aim to establish and define new computation methods whose application would have required many more years of effort, even if data had been available.

This research project has produced eleven reports, which are published simultaneously. The main report authored by the principal researcher for the project, Paul Marer, is published as a book, Dollar GNPs of the USSR and Eastern Europe (Johns Hopkins University Press, 1985). The eight country studies and two background papers are published separately in the World Bank Staff Working Paper series. The main report provides highly valuable insights into the problems related to the estimation and comparison of the GNPs and GNP growth rates of the CPEs. It also gives the author's best estimates of the actual values of these indicators for the majority of CPEs covered by the project, that is those for which there was some statistical basis for computing estimates or choosing between those already available.

The main report on the Research Project on CPEs concludes that adequate GNP data in national currencies can be derived for most CPEs by adjusting official information about net material product in the light of statistical and other information known to country experts. It further concludes that the best method generally applicable to CPEs for converting such GNP data from local currencies into dollars would use conversion rates based upon purchasing power parity (PPP) information. For comparison with

corresponding World Bank data on other World Bank members, these conversion rates should be adjusted to correct for the expected differences between the PPP rates and the actual official exchange rates (the "exchange rate deviation index"). The needed adjustments are estimated econometrically from the actual differences observed at each level of per capita GNP among the thirty-one market economies participating in Phase III (1975) of the International Comparison Project (ICP). For Hungary, Romania, and Poland, PPP information is derived from Phase III (1975) of the ICP, while for Czechoslovakia, the German Democratic Republic, and the U.S.S.R., it is derived from private bilateral comparisons chain-linked to the ICP data. This method yields a range of per capita GNP estimates: for example, $2,700 to $5,700 with a midpoint of $4,190, for the U.S.S.R. in 1980. No PPP estimate was available, and no GNP per capita figure in US dollars calculated, for Bulgaria and Cuba.

The main report also concludes that the official estimates of growth rates of the CPEs "tend to yield varying degrees of upward bias." For all countries except Hungary, the experts lean toward preferring alternative indices, constructed by outside experts with partial information, although these too present problems (especially for countries other than the U.S.S.R.) and the experts therefore fell short of endorsing them. The author of the study on Hungary leans toward preferring the official index at this time.

The country studies and background papers that are being issued in the World Bank Staff Working Paper series provide additional details on the CPEs studied and their exchange rates. Some of the country studies include the respective authors' estimates of per capita GNP in U.S. dollars. These estimates, however, are the individual authors' experimental computations, based on methods that may not be consistently applicable to CPEs generally.

There remain major uncertainties about GNP conversions by means of "adjusted PPPs." In addition to numerous remaining theoretical and practical problems associated with calculating PPPs within the framework of the centrally coordinated ICP, private estimates such as those used in this study for three CPEs still appear to be subject to a wide margin of error. Furthermore, there is no other way to estimate the exchange rate deviation index than to derive it from observation of the countries covered by the ICP (almost all of which are market economies). The applicability of an index derived in this fashion to the CPEs, whose economic structures are very different, remains subject to reservations.

The present study used ICP Phase III data relating to the year 1975, extrapolated to 1980. Phase IV ICP data already published shows estimates directly relating to 1980 for European countries, including Hungary and Poland; Romania, a participant in early phases of the ICP, has not provided the data needed for participation in Phase IV. It is noteworthy that Phase IV estimates of Hungary's and Poland's per capita GNP in 1980 are lower than the 1975 results extrapolated to 1980, used by the Research Report on CPEs. These differences are partly due to the greater attention paid in Phase IV to quality differences and to other methodological advances.

During the course of 1983 the Bank, with the help of a distinguished panel of experts, 1/ undertook a review of the methodological problems and issues related to the estimation of internationally comparable per capita GNP figures for all countries. The preliminary results of the research project on CPEs constituted an important input into that review, whose findings and

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1/ Abram Bergson, Harvard University, Chairman; Andre Vanoli, Institut National de la Statistique et des Etudes Economiques; and Parmeet Singh, Commonwealth Secretariat.

recommendations were approved by the panel of experts. In light of the review, the Bank has decided that for the time being (that is, at least until data availability and other problems related to PPP information are resolved), official GNP information converted at official exchange rates should generally continue to provide the basis of the per capita GNP estimates published in <u>The World Bank Atlas</u>. Exceptions to this rule are to be made only when official GNP data, in national currency, is exceptionally bad or compiled in ways which diverge in an exceptionally large measure from the usual methods and standards, or when the official exchange rate is exceptionally far removed from the rate effectively governing foreign payments transactions. When there is a reason to believe that such exceptional circumstances prevail, and adequate information exists, appropriate adjustments are to be made. When adequate information does not exist and cannot be obtained, no estimates are to be published. At the time of writing this foreword, it seems likely that lack of information will for some time prevent the Bank from making estimates of the per capita GNP of most CPEs. Thus <u>The World Bank Atlas</u> published in early 1985 contains an estimate of the values of GNP and GNP per capita for only one European CPE, Hungary.

Following the review endorsed by the panel of experts, the World Bank has adopted calculation methods and obtained results which, for a few countries, are different from those of the research project of CPEs. The Bank's general methodology must be applicable to all its member countries, including most market economies and only a few CPEs; the Bank could demand that its member countries provide additional information when needed; and it could, and did, decide not to estimate the per capita GNP of countries for which a minimal, but still fairly extensive set of information could not be obtained. As noted earlier, however, the research project on CPEs has aimed

at defining a method consistently applicable to all CPEs and one that could make use of available information. These differences in aims and constraints readily explain the differences in results.

The research project on CPEs, whose major findings are published in the main report, has greatly enhanced the understanding of the CPEs' unique macroeconomic accounting frameworks and pricing systems. It has provided insight into many substantive issues, in particular the relationship of domestic and international prices. The individual country reports, published separately, shed much light on many important country-specific issues. The Bank will continue to build upon the valuable findings of the research project on CPEs in its future efforts to understand these important components of the global economy.

<div align="center">
Jean Baneth
Director
Economic Analysis and Projections Department
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Background Studies for
Dollar GNPs of the U.S.S.R. and Eastern Europe
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A Study of Cuba's Material Product System, Its Conversion to the System of National Accounts, and Estimation of Gross Domestic Product per Capita and Growth Rates.

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National Income Statistics for Poland, 1970-1980.

The Conversion of National Income Data of the U.S.S.R. to Concepts of the System of National Accounts in Dollars and Estimation of Growth Rates.

Exchange Rates in Eastern Europe: Types, Derivation, and Application.

Exchange Rates, Foreign Trade Accounting, and Purchasing-Power Parity for Centrally Planned Economies.

Abstract

This paper presents U.S. dollar estimates of the per capita product of the German Democratic Republic for 1975 and 1980. The system of national accounts and valuation practices of the GDR are described. This discussion is followed by an assessment of the two most important Western Estimates of GDR macroeconomic performance by Wilkens and by Alton and his associates. Because of significant gaps in the published official GDR national accounts, estimates of Net Material Product by final use at 1967, 1975 and 1980 prices are derived in three appendixes. The GDR per capita national product of 1980 is estimated to have been $6,800, roughly 70% of the West German level.

SUMMARY

In order to obtain a dollar estimate of the per capita national product of the German Democratic Republic (GDR), it is necessary to obtain i) an estimate of GNP in the national currency unit (Mark) and ii) purchasing-power-parities (PPP) to convert the expenditure components of GNP into dollars. Because of severe data limitations, these steps are not independent. In fact it is the acute shortage of information on GDR prices which determines the research strategy behind the estimates to be presented in this paper. The Federal Republic of Germany (FRG) will serve as a link between the GDR and the USA. The national product of the GDR by final expenditure will first be converted to Deutsche Mark (DM) expenditures and then the components will be converted to dollars using the Kravis and associates estimates of the DM-U.S. dollar PPP.

The West German link is necessary because the only component of GNP for which there is a sufficiently recent and accurate PPP for the Mark relative to any Western currency is private consumption expenditure. The purchasing power comparisons come from the West Berlin German Institute for Economic Research (Deutsches Institut fuer Wirtschaftsforschung, DIW). These PPP's

are adjusted to allow for the influence of quantity constraints on measured cost of living. For the remaining components of GNP, extrapolation of old and relatively uncertain PPP's is necessary.

The choice to estimate GNP by final expenditure leads to a derived demand for the official Net Material Product (NMP) final-use accounts which are not published except as percentage shares or in the form of growth indexes. The necessary details behind the estimates of the level of NMP expenditure by final use are to be found in the first three appendixes to this chapter. The estimates of the GNP in the national currency unit as well as the PPP's used to convert DM totals are an eclectic combination of published official GDR statistics with Western refinements thereof.

The first part of the paper discusses GDR national accounting practices and price determination. Emphasis is on the peculiarities of the Material Product System (MPS) as applied in the GDR according to GDR sources. Special attention is also given to the subsidies to maintain relatively constant prices for basic consumer goods and how these subsidies fit into the national accounts.

In Part II the two most important Western estimates of GDR macroeconomic performance are examined. The best "recent" intra-German comparison of national products was conducted by Herbert Wilkens of the DIW. The major weakness of the Wilkens' estimates is to be found in the method of updating the base comparison for the year 1967 implicitly using official "real" series. The important work of Thad Alton and his associates at the

Research Project on National Income in East Central Europe provides inde-

pendent estimates of economic growth and the structure of GNP in East

Germany. However, the Alton and associates calculations were not intended

to match any specific body of price data to facilitate international com-

parison of output levels. The section closes with a rough estimate for

per capita GNP in 1980 obtained by updating Wilkens' estimate for 1967 with

the Alton and associates' growth rates ($7440).

In the final two sections of the paper Mark estimates of the national

product of the GDR for 1975 and 1980 are derived and converted into DM and

finally US dollar totals. The needed estimates of imputed housing rentals

for owner-occupied housing are derived in Appendix 5. The 1980 GDR per

capita national product is estimated at 16,800 DM or $6,800. This

corresponds to about 70% of the FRG level of that year.

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INTRODUCTION

In order to obtain a dollar estimate of the per capita national product of the German Democratic Republic (GDR), it is necessary to obtain both an estimate of GNP in the national currency unit (Mark) and purchasing-power parities (PPP) to convert the expenditure components of GNP into dollars. Because of severe data limitations, these steps are not independent./1 In fact it is the acute shortage of information on GDR prices which determines the research strategy behind the estimates to be presented in this chapter. Briefly, the Federal Republic of Germany (FRG) will serve as a link between the GDR and the USA. The national product of the GDR by final expenditure will be converted to Deutsche Mark (DM) expenditures which allow a comparison with the FRG national product as an interesting by-product. The Kravis et al. (1982) binary comparison of the FRG and the USA is the source for the PPP's needed to convert the GDR national product valued in DM into U.S. dollars.

The West German link is necessary because the only component of GNP for which there is a sufficiently recent and accurate PPP for the Mark relative to any Western currency is private consumption expenditure. The

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/1 Machowski (1982) has documented the decline in published official GDR statistics in a paper for the Committee on Security and Cooperation in Europe of the U.S. Congress. Certainly consistent with this policy is the fact that the GDR did not accept the invitation of the World Bank to participate in the Project on National Income of Centrally Planned Economies. Thus the estimates presented in this chapter are based solely on the published statistics and necessarily share the shortcomings of all such independent outside estimates.

purchasing power comparisons by Otto-Arnold at the West Berlin German Institute for Economic Research (Deutsches Institut fuer Wirtschaftsforschung, DIW) allow confidence in at least the personal consumption estimates here. Unfortunately for the remaining components of GNP, extrapolation of old and uncertain PPP's is the only course of action short of the completely ad hoc physical indicators approach./2

The choice to estimate GNP by final expenditure leads to a derived demand for the official Net Material Product (NMP) final-use accounts which are not published except as percentage shares or in the form of growth indexes. The necessary details behind the estimates of the level of NMP expenditure by final use have been confined to the first three appendixes to this chapter. Thus, the estimates of the GNP in Marks as well as the PPP's used to convert DM totals are an eclectic combination of published official GDR statistics with Western (mostly DIW) refinements thereof.

The first part of the chapter discusses GDR national accounting practices and price determination. Emphasis is on the peculiarities of the Material Product System (MPS) as applied in the GDR according to East German sources. Special attention is also given to the subsidies to maintain relatively constant prices for basic consumer goods and how these subsidies fit into the national accounts.

In Part II stock is taken of the two most important Western estimates of GDR macroeconomic performance. The best "recent" intra-German comparison of

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/2 See the description in Marer (1983) of this work which amounts to correlations between available physical series and GNP in order to extrapolate to countries for which one knows the several physical series but not the GNP.

national products was conducted by Herbert Wilkens (1981) of the DIW. However, the base year comparison was for 1967 with the results extrapolated to 1977 using official "real" series for the GDR. Other limitations of the Wilkens' estimates will be discussed below. The important work of Thad Alton and his associates at the Research Project on National Income in East Central Europe provides independent estimates of economic growth and the structure of GNP in East Germany. The Alton and associates calculations were not intended to match any specific body of price data to facilitate international comparison of output levels. Though no attempt has been made here to reconstruct either the Alton estimates to correspond to the available PPP's or the available PPP's to match the Alton estimates, nor is it obvious how one would, the work of Alton and associates is relevant to this chapter in two ways: first, as a check of the plausibility of the estimates presented here and secondly, the Alton indexes are recommended as the best available indexes for updating the estimates of this chapter. In Appendix 4 some of the assumptions behind the Alton estimates are checked against scraps of GDR data. The section closes with a rough DM estimate for 1980 obtained by updating Wilkens' estimate for 1967 with the Alton and associates' growth rates.

In the last two sections of the chapter Mark estimates of the national product of the GDR for 1975 and 1980 are derived and converted into DM and then US dollar totals. The needed estimates of imputed housing rentals for owner-occupied housing are derived in Appendix 5. The 1980 GDR per capita national product is estimated at 16,800 DM or $6,800. This corresponds to about 70% of the FRG level of that year.

I. <u>Problems and Particulars of GDR National Accounting and Valuation Practices</u>

This section outlines the most important details which distinguish the expenditure data obtained from the official GDR national accounts from the practice in other socialist economies./3 Special emphasis is given to the treatment of earnings from foreign trade due to the difference between domestic prices (Mark) and foreign trade prices (Valuta Mark, VM). An overview of the GDR price system follows with particular attention given to the link between producer prices, subsidies and consumer prices which plays an important role in the adjustment of NMPU statistics on personal consumption valued in producer prices into personal consumption at consumer prices.

A. <u>Expenditure Data from the MPS</u>

It is hardly a coincidence that differences across countries in the application of the MPS principles can be traced to differences in the interpretation of "material" and "net" in qualifying production. In Table I the most significant differences, i.e. those meriting explicit mention in East German sources cited above, have been listed.

The basic economic units in the territory of the GDR are classified as belonging either to the material (productive) or non-material (nonproductive) sector of the economy. The classification follows the Enterprise

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/3 Barthel <u>et al</u>. (1971) is the single most important GDR source and all subsequent treatments add very little to the discussion there. Neither the 3rd edition of the textbook by Lange and Lange, <u>Wirtschaftsstatistik</u> (1978), nor the relevant articles in the latest edition of the <u>Oekonomisches Lexikon</u> Vol.I (1977) show that any substantive changes have occurred in the meantime.

Classification Guidelines (Betriebssystematik) published by the State Central

Statistical Administration.

Because the basic unit for statistical observation is an enterprise

or organization, it is impossible without great cost to differentiate between

the material and non-material spheres within economic units. Thus, the

repairs and printing done in the state administration, while belonging to the

material sphere, are not counted as production nor are the cafeterias and

laundries in hospitals. The distinction material vs. non-material is based on

the economic activity of the unit in question regarded in its entirety.

The main branches of the material sphere are:

1. Industry and material handicrafts
2. Construction (including the building trades)
3. Agriculture and Forestry
4. Domestic trade
5. Other producing branches (e.g, publishing houses, data processing
    industrial design).

By "material production" is understood those material goods or

services sold to or intended for sale to other economic units. Internal

transactions which are included under gross turnover are <u>not</u> included under

material product.

Concerning the problematic distinction between productive and non-

productive services, the productive services are those:

a. for the maintenance or replacement of buildings and furnishings,
    equipment in both the material and non-material spheres, or for
    durable goods owned by the population.
b. involving the movement of material goods <u>or persons</u> as well as
    communications,

Examples of productive services include repair work in general, radio and

television broadcasts, transportation, storage, communications and textile

laundry and cleaning. Examples of nonproductive services include state

institutions, administrations and social organizations (political parties, military, etc)/4. It is important to emphasize that in GDR statistical practice, all transport services as well as postal and telephone communications are included under material product.

According to the principle of territorial material product, enterprises with continuing location on GDR territory are counted in the domestic product whether property of the GDR or not. Services of foreign firms conducting temporary construction work are counted as imports. The consumption of all individuals currently within the borders of the GDR (thus excluding GDR citizens temporarily abroad, but including all tourists, etc.) is accounted as material product domestically used.

Material Product is considered "net" in two regards. The first is that in order to eliminate double-counting the output of a sector is regarded net of material inputs. Non-material inputs, say, insurance services to an industrial enterprise are included in the net material product of a sector. The second deduction from Gross Material Output is depreciation of the fixed capital of the material sector only. Investment in housing or buildings in the non-material sector are treated gross of depreciation much like the acquisition of private households of consumer durables.

B. Prices, Subsidies and Price Changes in the NMP Accounts

Gross Material Product (GMO) and Net Material Product (NMP) are valued in prices which include product-specific turnover taxes

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/4 For 36 categories of "services paid by the population" classified as either material or non-material, see the detailed description of the monetary balance of the population in Keck (1968), pp. 144-145.

(Erzeugerabgabe-preise). These prices are generally distinct from two other main price types: producer prices (Betriebspreise) which do not include any product-specific-turnover taxes or subsidies, and consumer retail prices (Einzelhandelsverkaufspreise). The market prices paid by consumers differ from the turnover-tax-prices (TTP) by the margins allowed for wholesale and retail trade. It is important to be aware of these different price types when coupling the NMP accounts by sector of origin with the accounts by final use. The basic gross expenditure data in TTP for the sector of origin accounts are easily obtained from the producing enterprises which are liable for the turnover tax. The basic expenditure data for the construction of the NMP accounts by final use are gathered from the economic units which are consuming and accumulating the NMP. Similarly, in determining the value of material inputs used in production to derive the net material product of a sector, the expenditure data on inputs are gathered from the buyer's side of the transaction. Special care is required to maintain a consistent TTP valuation of the sources and uses of NMP when subsidies drive a wedge between the TTP and price actually paid. The special problem of differing domestic and foreign price structures is postponed to the following section.

Price setting. Producer prices are built up from costs so that a brief description of enterprise cost accounting is in order here. The classification of costs corresponds to the departmental structure of enterprises. Costs which are generated in actual production departments are called the 'technological' costs. The production departments are coordinated by production management which are considered 'production overhead costs' (Abteilungsleitungskosten) -- these together with the technological costs are called the 'departmental costs'. To this one adds the costs from the

purchasing department (Beschaffungskosten) and all other management costs as well as the social costs incurred by the enterprise. This last total is called 'production prime costs'. To this is added 'unplanned costs' to arrive at the 'prime costs'. In the setting of prices by the Office for Prices, it is not the actual costs, but rather normative costs which are used in the cost calculations.

For departments which produce more than one output, the technological costs are broken down into those which are directly attributable to particular products, e.g. labor costs, material costs, and costs which can only be indirectly assigned to a particular output, e.g. depreciation.

The difference of the 'producer price' and 'prime costs' are the 'gross profits' from which the levy on productive assets (Produktions-fondsabgabe) must be paid to the state. The productive funds are the sum of the gross value of fixed assets plus working capital. The levy is 6% of this value and should in principle make up between 40 to 60% of gross profit. The value of the fixed capital is based on the revaluation of fixed capital in 1963 at 1962 prices (before the price reforms of 1964-1967). The working capital is valued at cost of purchase. This levy is <u>not</u> considered part of costs in the determination of price. When it was discovered after the introduction of the productive assets levy in 1967 that capital intensive branches had difficulty in paying a 6% levy from gross profits, a differ-entiated system of rates from 1.4 to 6% was introduced until 1971 when the 6% levy became uniform (exception: agriculture). So-called 'asset-based' prices (fondsbezogene Preise) were introduced for some goods between 1969 and 1970 which amounted to a recognition of a cost of capital explicitly in determining the cost base for price setting. With the recentralization of the 1970's,

this form of price setting was for the most part discontinued for <u>new</u> price setting though it remains the subject of discussion. A similar charge for cooperative handicrafts was introduced in 1972 as a productive assets tax charge, though it is charged as a percentage of turnover.

The remaining net-profit is taxed (Nettogewinnabfuehrung) and what remains goes into the enterprise bonus fund, investment fund, working capital fund, repayment of loans, and insurance payments. This is a planned quantity and the residual profit, i.e, net profit (net of the net profits tax) above the planned residual profit is split evenly between the state and the enterprise./<u>5</u>

To the producer price there is then added, when applicable, a product specific turnover tax. As a general rule, it is consumer goods which are taxed. In the case of important commodities, the production of which is to be encouraged, product-specific subsidies can be paid as well. The sum of producer price and product-specific turnover tax or subsidy is the TTP. In Table II the receipts of the state budget have been broken down by source. It can be seen that as a source of tax revenue from the publically owned sector of the economy, the turnover tax has fallen from 50% to 38% from 1970 to 1981. The net-profit tax has become the single largest source of revenue from the publicly owned sector of the economy.

TTP is the yardstick used to measure the NMP. For transactions such as foreign trade where exchanges are accounted in a different price system, imputed TTP's for the imports and exports are calculated to maintain

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/<u>5</u> <u>DDR-Handbuch</u>, 2nd Edition (1979), p. 486.

consistency./6   One exception to the rule is the valuation of unfinished commodities and stocks of finished goods which are valued at prime costs. Another exception is the valuation of income-in-kind, e.g. food for own consumption produced in agriculture, which is calculated at retail prices to enable comparisons across social groups.

Subsidies. To maintain consistency between the source and use side of the NMP accounts, subsidies, which are paid for final uses (consumption, accumulation or export) and cause final purchase price to deviate from TTP, must be added to the final expenditures on material product which are gathered at actual transaction prices./7   Subsidies paid for consumer goods and services recorded in the state budget are presented in Table III.

Subsidies paid for intermediate goods are treated differently from those for final goods when the purchase price of, say, raw materials is higher than the costs of material consumption entered into the accounts of a particular producer (e.g., agriculture). To avoid double-counting in value-added (i.e. to avoid crediting the supplier of the raw material with value-added at the TTP and understating the costs of the purchasing sector by the amount of the subsidy and thereby increasing its value-added), the total value of such subsidies must be added to the aggregate intermediate consumption and subtracted from net-product.

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/6   See Section I.C. below.

/7   See Schmidt (1968), p. 32 and Barthel et al. (1971), p. 61. Lange and Lange are unambiguous on this point, "With the justification of maintaining a unified valuation of material funds (Fones), the subsidies for consumer goods and services for the population are classified as part of individual consumption". Lange and Lange (1978), p.262.

In Table IV statistics on the subsidies paid to enterprises and agriculture are displayed. There are two sorts of subsidies: the product specific subsidies are those for prices which are set in general below costs; compensation for price adjustments are for subsidies paid to particular classes of buyers who are to be shielded from planned price changes. The compensation is either to maintain income levels of the purchasers or to enable direct suppliers of consumer services to keep prices constant. Both forms of subsidy are paid from the state budget.

Price Changes and Real NMP. The East German NMP accounts are available through 1975 valued at 1967 prices, through 1980 valued at 1975 prices, and have most recently been published through 1981 in 1980 prices./8 The base year is not only important for prices, but the "structure" of the base year (e.g. the classification of economic units as productive/nonproductive or by industrial branch, mergers of economic units, etc.) is also held constant. In order to calculate the real net material product both the gross output and the value of material inputs are deflated by the corresponding deflator (i.e. double deflation). Barthel et al. (1971) describe the methodology in constructing a "constant-price" series:

> As in other socialist countries the GDR too uses a mixed method. By this we mean that price indexes and the absolute changes in level of revenues or expenditures due to price changes from one year to the next are used for the transformation from current to constant prices./9

The price indexes use current year quantities as weights (Paasche indexes).

/8 References to the Statistical Yearbook of the GDR for a given year will be abbreviated "SJDDR" followed by the year and page reference. The NMP accounts are published in 1967 prices in SJDDR 1976, pp.33-38; in 1975 prices in SJDDR 1981, pp.77-82; in 1980 prices in SJDDR 1982, pp.87-92.

/9 Barthel et al. (1971), p. 32.

The second method of using the absolute changes in expenditure data is somewhat unusual. According to the standard textbook of economic statistics/10 the entire centrally planned, socialist sector of industry must report both commodity production (differs from "gross output" by the change in unfinished products and services) and material consumption in current as well as in the prices of the immediately preceding year. Through the addition or subtraction of the absolute changes in the levels of revenue or expenditures (Preisaenderungsbetraege) to or from the level of the previous year, which has also been so adjusted, a constant price series can be calculated.

Algebraically, a series in constant prices is calculated recursively as:

$$Z(t) = Z(t-1) + [Y(t,t-1) - Y(t-1,t-1)]$$

where $Y(i,j)$ is the level reported by the enterprise of series Y in year i in the prices of year j; $Z(t)$ is the constant-price series which corresponds to the nominal series $Y(t,t)$. In the base year t^*, $Z(t^*)=Y(t^*,t^*)$. This calculation is illustrated in Table V. The rows are the observation years and the columns are the years of the prices used for valuation. The diagonal of the matrix is simply the series in current prices, $Y(t,t)$.

The other part of productive consumption, depreciation, is considered to be more problematic to transform into constant prices. Barthel _et al._ (1971) write:

> Depreciation charges are fundamentally to be calculated according to the depreciation allowances of the base year (then 1967). The basis for these allowances are the stock of fixed assets in constant prices and the depreciation percentages for the year 1967. In the event of future valuations of fixed assets and/or changes in these percentages, the base year 1967

/10 Lange and Lange (1978), pp. 226-227.

will be continued until a new price basis for the entire social product and national income is introduced./11

In the meantime no revaluation of fixed assets has occurred and according to Lange and Lange (1978), the valuation of fixed assets in 1966 prices only occurs at the Central Statistical Office which uses price indexes for types of investment goods./12

It appears as if the magnitude of change in the percentage depreciation allowance between base years is not significant at the macro level (if it changed at all). For the 1980 price and structural basis one can calculate the ratio of depreciation and rental charges to the value of fixed assets (1966 base year) for the year 1971 -- 4.69% for the productive sphere. For the 1975 price and structural basis the same ratio for the observation year 1980 amounts to 4.68%.

One GDR source reports the results of calculations that the accumulated depreciation charges on assets which had been written off amount to between 50 to 56% of the replacement value of the assets at current prices./13

C. Special Earnings From Foreign Trade

An important deviation from Soviet national accounting practice occurs in the valuation of net exports in NMP. For the Soviet case there appears to be general agreement that net (material) exports linking NMP

/11 Barthel et al. (1971), p. 34.

/12 Lange and Lange (1978), p. 90.

/13 Ibid., p. 91. The polar explanations of this area: (i) depreciation rates have been set too low or (ii) the price level of fixed assets has approximately doubled.

produced and NMP utilized are calculated in foreign trade prices. In contrast the East German NMP accounts consistently use the standard of <u>domestic</u> TTP price. This is clearly stated by Barthel <u>et al.</u> (1974) who write as producers of NMP statistics:

> The precondition of greater integration of national income and product accounting into the system of enterprise accounting and statistics is that national income and product accounting takes as its starting point the objective market conditions facing the enterprise together with its corresponding forms of accounting. This principle finds its expression in valuation of GMO and NMP both produced and used as well as <u>export and import at the actual purchase price.</u>/14

This is consistent with the estimates of exports and imports in domestic prices derived from the econometric model of Bilow <u>et al.</u> (1974). See Appendix 1 for further details.

The GDR is certainly aware of the "special earnings of foreign trade" but the discussions in Barthel <u>et al.</u> and in Lange and Lange (1978) do not treat this as a form of material income which is to be accounted for, but rather as a qualification in the interpretation of the net export figures. Lange and Lange use exactly the same numerical example found in Barthel <u>et al.</u> to illustrate the special earnings of foreign trade which they call the "direct benefit of foreign trade". Lange and Lange write further:

> (The calculated direct benefit of foreign trade) is indeed a true gain from trade, which though <u>not</u> reflected in balances at domestic prices, do represent an increase in national wealth valued at domestic prices./15

/14 Barthel <u>et al.</u> (1971), p. 30. Emphasis added. Note that "purchase price" here refers to domestic TTP.

/15 Lange and Lange (1978), p. 218. Emphasis added.

Because there is almost no data on the value of exports and imports in domestic prices, it is only possible to give an approximate estimate of the average magnitude of the special earnings from foreign trade for the period 1963 through 1971. The average value of exports and imports in domestic prices for the sample period was estimated from the estimated coefficients of the Bilow et al. econometric model (See Appendix 1).

Using the formula for the special earnings of foreign trade, one can calculate that this benefit amounted to about 2.9 billion Marks annually for 1963-71 which was about 3% of the average NMP for that period./16

II. Existing Western Estimates of East German GNP and Growth

In Part I attention was given to the methods of accounting and valuation behind the official GDR statistics of national product. In this part two recent western recomputations of the GDR national product will be considered and assessed./17 The first recomputation to be discussed is that

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/16 The calculation is as follows:
2.9 billion Marks = (15.4 − 14.8).1.5 − (23.1 −25.1)
                   trade balance   trade balance
                   at foreign   at domestic
                   trade prices   prices
Note that the factor 1.5 is the ratio of the value of exports at foreign trade prices to exports valued at domestic prices. See Appendix 1.

/17 Emphasis here is on recent. There is quite a flurry of estimates for the early and mid-sixties of varying degrees of thoroughness from Stolper (1960) on the exhaustive end of the spectrum to Klinkmueller and Machowski (1966) representing the short-cut school.

of Herbert Wilkens of the DIW./18   The second set of estimates comes from

the Research Project on National Income in East Central Europe of Thad Alton

and his associates./19   In the final section of this part of the chapter, a

simple per capita GNP for 1980 in DM is derived which updates the Wilkens

estimate for 1967 via the Alton and associates' index of GNP at adjusted

factor cost.   This Wilkens -cum-Alton estimate is the only serious competitor

to the estimates for 1980 of this chapter.

/18 Wilkens(1981). In any quantitative investigation of the GDR economy
     there are essentially two German sources: the first is the State Central
     Statistical Administration of the GDR, and the second is the German
     Institute for Economic Research (Deutsches Institut fuer
     Wirtschaftsforschung, DIW) in West Berlin. While there can be little
     doubt about the former's position in the production chain as the
     monopolist-producer of that crude resource, GDR economic statistics, that
     resource is refined into a usable form for the most part in Berlin-
     Dahlem. The technology for processing "GDR-crude" has been highly
     developed by the DIW, to the point of which any third party interested in
     reconstructing the DIW's methods and assumptions is led into a seemingly
     infinite regression from footnote to footnote of Weekly Reports,
     Quarterly Reports, Special Reports and Contributions to Structural
     Research (Wochenberichte, Vierteljahrshefte zur Wirtschaftsforschung,
     Sonderhefte, Beitraege zur Strukturforschung). When one is fortunate,
     the process of footnote tracking ends in the appropriate GDR source with
     a sketch of the calculation methods. Quite often one runs into the dead-
     end "Calculations by DIW", which could be the result of modesty in the
     display of a naked assumption or even the result of the cat-and-mouse
     game played between the statisticians of East and West Berlin. Whatever
     the reason for the lack of unambiguous documentation as to assumptions
     and calculating procedures, most consumers of DIW output are still left
     with little choice other than to accept the results as published by the
     DIW as reasonable approximations to the "Truth", less costly than
     crunching the numbers in the SJDDR on one's own account. For a similar
     comment on one important DIW study see the Keren review of Melzer (1980),
     "It is footnotes and not tables which one needs." Keren (1982), p.468.
     One could even say that the drop in GDR published economic statistics
     could be partially attributed to the value-added to the official GDR data
     by the DIW! In fact professional economists in the GDR rely on the DIW
     for data on their own and other CMEA economies which would otherwise be
     locked away on a need-to-know basis.

/19 Alton et al. (1981), (1982).

A. <u>Wilkens</u>

Table VI presents the Wilkens' estimate of GDR national product for 1975 which scales-up from the official NMP statistics. Since the Wilkens' Mark estimate of national product according to Western accounting methods differs somewhat from the estimate to be presented later in this chapter, the steps of his calculation will be reviewed in some detail. More important for the difference in DM estimates for per capita national product between Wilkens and those of this chapter are two likely sources of upward bias in Wilkens' estimates of the PPP of the GDR Mark relative to the DM. These biases are an optimistic assessment of GDR relative industrial productivity for 1967 coupled with the use of official "constant" price series to update the base comparison for 1967.

1. <u>Correction for Unreported Economically Active Persons</u>. As Table VII reproduced from Wilkens indicates, the DIW estimates that 6.5% needs to be added to official labor force statistics to correct for the underreporting in the published employment statistics. These estimates are then used at each stage of Wilkens' calculations to inflate published statistics on value of production and fixed assets, assuming constant productivity and capital-labor ratios between secret and non-secret enterprises within a branch. From Table VI one can see that this correction amounts to a 4.6% addition to the official NMP statistics.

Two examples which support the belief in underreporting are given. The first is a statement in the SJDDR 1963 that employees of social organizations are no longer counted (p.21) -- this resulted in an omission of some 50,000 employees. The second example is the difference found in comparing the official census reports with the employment surveys published in

the SJDDR. In the former 'economically active' population is significantly higher than the figures for 'gainfully employed' for the same years. The census reports are for January 1, 1971 when 8.214 million persons are reported to have been economically active. Since the annual employment figures refer to September 30, through simple interpolation between the employment statistics for 1971 and 1970 one obtains a figure of 7.776 million reported in the employment statistics for a difference of almost 440,000 persons. From published DIW materials it is impossible to figure where the remainder of the unreported 540,000 economically active persons claimed in Table VII are accounted for.

The Armed Forces of the GDR are estimated by the International Institute for Strategic Studies to have been 143,000 in 1975--of which 87,000 were draftees--plus another 70,000 accounted for by the border guards and special security troops under the Ministry for State Security.[20] The professional component of the military and paramilitary forces might make up that difference, but it is not obvious just how the DIW has accounted for military employment.

While it is fairly certain that the employment statistics are indeed guilty of a significant amount of underreporting, it does not necessarily follow that such practices are consistently carried through all other accounts, in particular the NMP accounts which are part of the larger input-output accounting system. One should not overestimate the consistency of even the GDR's State Central Administration for Statistics system of balances. Omissions which are easy in certain sets of accounts, like the labor force

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[20] International Institute for Strategic Studies (1976), p. 78.

accounts which are simply the sum of enterprise accounts, are much harder to get away with in accounts which show flows of product or funds between enterprises. Since there are two parties to any transaction, suppression of accounts of a secret enterprise without suppressing the corresponding particular expenditures or receipts which show up in the accounts of a nonsecret enterprise would cause inconsistencies. Given that as a practical matter GDR statistical authorities cannot even go within an enterprise to distinguish material from non-material activity, hence the total classification of an enterprise as belonging to either the material or non-material sectors, it seems very unlikely that the distinction of secret vs. non-secret transactions could be maintained for the sake of national income accounting.

For such large-scale deception (6.5% of the labor force) to work, there is basically only one consistent, cheap strategy given the interdependence of economic activities, i.e. to view all economic activity (including nonmaterial activities) within the framework of one very secret detailed input-output table and then to decide the optimal aggregation of secret activities within regular economic activities for publishing statistics./21. In the event that too much information is being revealed, then one always has the option of increasing the degree of aggregation as the GDR recently has in fact done by reducing the "detail" of its statistics for aggregate accumulation.

/21 Cf. Treml et al. (1976).

Thus it can be concluded that even if Wilkens and the DIW have the unreported employment correct, the correction to NMP suggested in Table VI is most likely an upper bound.

2. <u>Depreciation in the Productive Sector</u>. Wilkens' figure is higher than officially reported depreciation in the producing sectors by about 3.5%. This assumes that the depreciation of the unreported enterprises corresponding to the unreported employment discussed above is not included in the official statistics on depreciation charges. This adjustment upwards is based on the assumption that the capital-labor ratio in unreported enterprises is the same as in reported enterprises with the same percentage charge on fixed assets for depreciation.

3. <u>Deduction for Intermediate Service Outputs for Material Sector</u>. For 14 sectors in the material sphere Wilkens computes shares of intermediate service outputs in net product which are derived from the 1966 DIW input output calculations for West Germany. Unfortunately to this adjustment is that "The shares of intermediate service outputs in the West German net product--are reduced, since the GDR service sector is far less developed, and its contributions to the producing subsectors must be expected to be correspondingly smaller."/22 Thus the reader only knows the direction and not the magnitude of this <u>ad hoc</u> adjustment.

4. <u>Non-material services</u>. This item was calculated by estimating the incomes in the service sector. Due to the fact that average wages for this sector are not available, Wilkens uses the wage and salary structure of West

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/22 Wilkens (1981), p. 45. Cf. note g in Table XIV.

Germany since he finds the correlation between wages and salaries for the two Germanies across productive subbranches to be high. Wilkens adjusts the West German wage-relatives in the nonmaterial sphere by squeezing the wage distribution across nonmaterial subsectors together since the West German wage structure has a greater variance in the material sector than the East German wage structure.

5. Conversion to DM. The implicit PPP for the entire national product in 1967 according to Wilkens (p.69) was .943 DM/M. Because of the relatively greater inflation in the FRG the implicit PPP grew to 1.358 DM/M by 1976. This growth is certainly overstated due to the new-product-bias in GDR "constant" price series./23 Wilkens describes his procedure for updating his estimate of the PPP:

> In view of the need for more up-to-date information and the absence of adequate data, these estimates (i.e. of East German GNP in DM) were extrapolated by means of a method akin to the procedure adopted by Kravis and his research team: the results were adjusted by means of the real production indices of the GDR, then inflated by means of West German price indices./24

This procedure is no doubt responsible for the dramatic relative increase of GDR per capita national product from a calculated 78% of the West German level in 1967 to 83% by 1976. In Table VIII one can see that the so-called real production indices of the GDR calculated by Wilkens grow essentially at the same rate as the official NMP. Whatever shortcomings the official real series have are shared by Wilkens' recomputations.

/23 U.S. Congress, Joint Economic Committee (1982), p. 37.

/24 Wilkens (1981), pp. 69-70.

Unfortunately the entire description of the PPP's used by Wilkens in his conversion of 1967 GDR national product into DM takes place in less than ten lines of text, four footnotes referring to previous DIW work without further explanation, and a table with the PPP's by sector. Thus it is difficult to assess the reasonableness of his conversion factors for 1967 solely based on Wilkens (1981). Since industry accounted for some 54% of GDR national product in 1967, a partial assessment is possible based upon the DIW (Wilkens and Melzer) estimates of comparative productivity in East and West German industry which are cited by Wilkens as the source for the PPP's to convert GDP originating in industry./25

The cited comparison is based upon about 200 industrial goods for which quantities were published in the SJDDR and for which corresponding quantities could be found in the West German industrial production reports. Since the West German quantity data is published with value statistics in DM, average unit prices could be used to value the GDR quantity series in DM, thus allowing a comparison of gross output. These DM gross outputs for the GDR industrial commodities were then classified according to the West German industrial system. Industrial branches were aggregated using West German gross output shares. To obtain value-added, the West German ratios between gross and net output were used to eliminate the cost of intermediate goods and services for the GDR industrial output in DM prices.

There are at least two reasons that this method should result in a relatively optimistic estimate of GDR industrial productivity. First is the

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/25 DIW, "Arbeitsproduktivitaet in der Industrie der DDR und der Bundesrepublik -- ein Vergleich" (Labor Productivity in Industry of the GDR and the Federal Republic -- A Comparison), Wochenbericht No. 20, 1970, pp. 137-141.

assumption that the quality is the same in the two Germanies, i.e. a rose is a rose. The very fact that in the East German language the prefix "West-" is used mainly to imply high quality, e.g. "West-chocolate", "West-coffee", "West-clothing", "West-cigarettes", "West-soap", "-West-automobile", hardly supports the hypothesis that quality is identical in the two Germanies. Second, the assumption of constant ratios of purchased inputs to value of output across industrial branches for the two Germanies would seem to assume away from the beginning one of the important sources of productivity differences, i.e. efficiency in the use of material inputs.

B. Alton and Associates

The adjusted factor cost estimates of East German GNP for 1975 by Alton et al. (1981) are of no direct use for the task of this chapter to obtain a U.S. dollar estimate of East German GNP. The purpose of the Alton adjusted factor cost estimates of GNP is to provide economically meaningful weights to aggregate the real indexes of branch growth.

The Alton estimates of GNP growth involve the aggregation of mostly physical series (tons of steel, etc,) using two different weighting schemes-- at the branch level physical series are weighted by approximate shares derived from the GDR physical quantity series times average unit prices from Hungary; to aggregate branch growth indexes, estimates of value added based on employment and capital inputs in the respective branches are used. The sampling error of Alton's estimates must necessarily be increasing over time with the falling trend in the publication of official economic statistics as described. This is undoubtedly one of the reasons that Wilkens chose to extrapolate his results from 1967 rather than recalculate PPP's based on the

available quantity series (for 1967 Wilkens could choose the approximately 200 industrial commodities from some 336 published in the SJDDR 1968; in the SJDDR the published series in physical units of industrial commodities had dropped to 170). It would be hard to make a case that the sampling error should be biased in either direction. The virtue of the Alton and associates measures of growth is that they avoid relying on official valuation practices which as mentioned earlier are suspect because of new-product pricing. However, it is unlikely that there have been no increases in quality of the goods over time in the Alton and associates sample so that there is probably a tendency for the Alton growth rates to understate actual growth. Hence the choice between the official (or Wilkens-type) estimates of growth and the Alton and associates estimates is between a low-variance, definitely upward biased estimate and a high variance (due to sampling error), probably slightly downward biased estimate.

A few control calculations support the Alton and associates estimates. Per capita GNP in West Germany grew at an average annual rate of 3.14% over the period 1960-1980./26   The GDR population fell 2.⌄% from 17.188 million people in 1960 to 16.740 million in 1980. The Alton index for East German GNP at adjusted factor cost went from 62.5 to 112.4 for the same period. This implies an average annual rate of growth of 3.11% for GDR per capita GNP--virtually identical to the West German rate. Thus the Alton growth rates, if correct, imply a constant percentage gap between the per capita national products of the two Germanies in 1960 and 1980. This can be compared to what would have happened to the percentage gap between the two

/26 Statistisches Bundesamt, 1982, pp. 194, 197.

Germanies had the East German GNP in fact grown as fast as the officially reported NMP:

If per capita GNP in the GDR had been X% of that of the FRG in 1960,

X%=1960 relative GDR	40%	50%	60%	70%	80%	FRG(100%)
Y%=1980 relative GDR	54%	67%	81%	94%	108%	

then in 1980 per capita GNP in the GDR would have been Y% of the FRG's. When one considers that the estimate for 1955 by Stolper (1960) had the relative GDR per capita national product at 68% of that of West Germany, then at official growth rates the GDR must have come roughly as close to the FRG level as Belgium./27

C. Per Capita GDR National Product 1980 Valued in DM (Wilkens-cum-Alton

Updating the Wilkens 1967 comparison with the Alton and associates index for real GNP growth provides a particularly simple estimate of the gap in per capita product between the two Germanies for 1980. In Table IX the steps in this calculation are presented. This mixed estimate of 1980 per capita GDR national product is 18,400 DM (or $7440 based on updated PPP of DM relative to the US dollard from Part IV below). This estimate is about 12% higher than the estimate of this chapter and is about 76% of the West German level. Recall that by 1977 Wilkens calculated the GDR per capita national product to have already achieved 83% of the West German level.

/27 Kravis et al. (1982), p.231--the FRG comparison with Belgium there is for the year 1975.

III.   Estimates of GDP for 1975 and 1980

The purpose of this section is to provide national product estimates by final use for 1975 and 1980 at current Mark prices. The first set of estimates are scaled-up from the estimated NMPU data described in the first three Appendixes to this chapter. A second set of estimates scaled-up from NMP are used as a check. Again, the reason that an estimate of national product by final use is needed is to exploit the sole current available PPP which is for personal consumption expenditure. In Part IV of the chapter attention will be focused on the difficult task of converting these figures to DM and then U.S. dollar magnitudes.

A. NMPU Scaled-up to GDP

1. Consumption. Personal consumption expenditures amount to approximately half of the national product of the GDR. It is very fortunate for this important component that the PPP's estimated by Otto-Arnold (1979) exist which permit the revaluation consumption expenditures in DM. Care must be taken in going from the individual consumption component of the NMPU accounts to an estimate of personal consumption expenditures with regard to the valuation basis. The value of individual consumption of NMPU includes the subsidies paid to maintain stable consumer prices./28 Thus an adjustment is necessary to adjust the official value data to consumption expenditures valued in retail prices. One must add non-material services paid by the population. Since depreciation on fixed capital in the nonproductive sphere is not deducted from GMO to obtain NMP, no adjustment is needed as is the case

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/28 Barthel et al. (1971), pp. 60-61 are unambiguous on this point.

with the CIA reconciliation of the 1970 GNP and NMPU accounts for the Soviet Union./29

Table X presents the adjustments to the estimates of material consumption for 1975 and 1980 in current prices. Details of the calculations are to be found in the notes to this table.

2. Investment. Again one starts with estimated "official" NMPU data from Table A2-I. Net investment in the productive sphere for 1975 was 14.1 billion Marks. Gross investment in the nonproductive sphere was 13.0 billion Marks. Changes in inventories , stocks and reserves was 4.1 billion Marks. According to published official statistics, depreciation and related charges in the productive sphere amounted to 17.7 billion Marks. The sum of these items is 48.9 billion Marks.

Before proceeding further it is interesting to compare these figures with the published official investment statistics. In the SJDDR gross investment in the productive sphere in 1975 amounted to 33.8 billion Marks. Here the total is estimated as 14.1 + 17.7 = 31.8 billion Marks. Part of the discrepancy between investment and accumulation statistics can be explained by the following clarification found in Barthel et al. (1971):

> Investment expenditures...are to be reduced by the amount spent for the purchase of land or used fixed capital. In addition costs incurred in transfering fixed assets or construction management (Bauleitungstaetigkeit), etc. are to be deducted. Such expenditures are not a part of the disposable material product of the year in question and indeed some are not part of the material product at all/30

Assuming the calculations of official NMPU accumulation statistics to be reasonably correct, one might conclude that this difference reveals the figures from the investment reports are overstated by approximately 6% for the

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/29 U.S. Central Intelligence Agency (1978), p. 7.

/30 Barthel et al. (1971, p. 53.

purposes of accounting for capital formation in the productive sphere. This is probably only part of the explanation for the 6% difference.

This naturally leads to considering the published official level of gross investment in the nonmaterial sphere which is 8.9 billion Marks. In contrast to the material sphere this is 4.1 billion Marks <u>below</u> the figure derived from the NMPU accounts. Assuming the same sort of overstatement in investment figures for the nonmaterial sphere, the difference becomes something more like 4.5 billion Marks. Rather than delve too deeply at this time into the mysteries of this particular residual, which most likely reveals defense related accumulation,/<u>31</u> let it be simply noted here that this supports the above assertion regarding official secrecy that while it is simple to delete from the sums of horizontally (or vertically) related balances), input-output balances are difficult to doctor by means other than by aggregation. Another possible explanation would be that subsidies to accumulation, analogous to those for private consumption, are particularly heavy in the non-material sphere./<u>32</u>

Large-scale capital repairs have been counted as part of costs rather than as part of investment since 1966. For this component the DIW estimate of 1.2 billion Marks for 1975 is used as is./<u>33</u> Together these figures give an

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/<u>31</u> Cf. Wilkens (1981), pp. 15-16 and p. 65. Wilkens seems very skeptical of the NMPU estimates which as seen in Appendix I agree with those derived here. Unfortunately he is not explicit why these estimates should be any worse than, say, the DIW recalculation of aggregate incomes.

/<u>32</u> Again Bartherl <u>et al.</u> (1971), pp. 60-61. Also Schmidt (1968) one of the co-authors of Barthel in an article.

/<u>33</u> DIW (1977), p. 330.

estimate for gross investment of 50.1 billion Marks (48.9 + 1.2), per capita 2980 Marks.

This is very close to Wilkens estimates for 1975: gross investment of 49.4 billion Marks of which 23.7 billion Marks for equipment, 21.8 billion Marks for structures and 3.9 billion Marks in inventory increase./34 Since Wilkens derived the 3.9 billion Mark figure from the NMPU figures as well, the difference of the two sets of estimates for changes in stocks and inventories of .2 billion Marks indicates that the estimate here of NMPU for 1975 is slightly higher than that estimated by Wilkens.

Estimates for investment expenditures are displayed in Table XI.

3. <u>Government.</u> In Table XII the estimates for the government component of national product are presented and described. Non-material services purchased by the government have been ignored and the total consists of the sum of government consumption of material goods and the wage bill.

4. <u>Net Exports and Losses.</u> The difference between Net Material Product produced (NMP) and Net Material Product Utilized (NMPU) is equal to the sum of net exports valued at domestic prices plus losses (e,g. through fire, disaster). Because of the residual nature of this position, it is subject to a great deal of uncertainty. If the estimates for NMPU are 1% in error, this would cause about a 75% error in the estimate of the sum of net exports and losses.

/34 Wilkens (1981), p. 101.

Unfortunately there are no indications of the extent of such losses,

which are one component which must be added to NMPU to scale-up to GDP./35

For the sake of argument one can assume that losses amounted to 1% of NMP for

both years which would indicate very small positive net exports for both years

at domestic prices. In contrast, the actual material net exports valued in

foreign trade prices were negative: the GDR imported net 4.2 billion VM in

1975 and 5.8 billion VM in 1980. During the mid-1960's the relation between

domestic and foreign trade prices were approximately the same for exports and

imports—according to the estimates presented in Appendix 1, 1.7M=1VM for

imports and 1.5M=1VM for exports. Since the purpose of dual price levels is

to shield domestic prices from changes in international prices, it can safely

be assumed that the foreign trade prices would change faster with changes in

international prices than domestic prices. Since the GDR has undergone a

dramatic worsening of its terms of trade since the 'sixties,' being largely an

exporter of finished goods and an importer of raw materials, the conversion

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/35 From the Bilow et al. (1974) econometric model which served so well in
Appendix 1, there is no clue to the magnitude of losses. A likely
explanation is that losses were aggregated into the series on exports.
The average NMP for the sample period 1963-1971 was 93.972 billion
Marks. Average exports and imports valued in domestic prices (which is
due to the uncertainty in the estimate of NMPU and in the magnitude of
losses) and iii) the present conversion valued at domestic prices were
equal to 23.1 billion Marks and 25.1 billion Marks respectively. Average
NMPU for the period based on the estimate from Appendix 1 was 96.52
billion Marks. The relation between NMP, net exports, losses and NMPU
is:

NMP = NMPU + Exports - Imports + Losses.

Substituting the averages for NMP, NMPU, Exports and Imports into this
formula results in negative losses on the order of half a billion Marks,
Because of the residual nature of the calculation it is likely that the
size of losses is just too small compared to the errors from rounding and
estimation of the NMPU, Imports and Exports figure to be discerned.

coefficients between foreign trade and domestic prices could indeed have changed enough that even a large surplus of imports at foreign trade prices could correspond to an export surplus in domestic prices.

Given the uncertainties regarding i) the magnitude of losses (which would be added to NMPU), ii) the magnitude of net exports valued in domestic prices (which is due to the uncertainty in the estimate of NMPU and in the magnitude of losses) and iii) the present conversion coefficients between domestic and foreign trade prices, it would be unreasonable to do anything other than sweep the sum of net exports and losses into the error of the estimate of aggregate national product. There is a presumption that this error would bias the product calculation upwards because of the size of the import surplus which would easily dominate any likely magnitude of aggregate losses. On the other hand, this bias would not amount more than a few percentage points.

5. Estimate of National Product by Final Use in Marks

Adding the estimates from Tables X, XI and XII, one obtains the national currency estimates for GDR. For 1975 the GDP by final use is estimated to be 171.7 billion Marks. For 1980 the estimate is 220.5 billion Marks.

B. NMP Scaled-up to GDP

To check the estimates of III.A. above an estimate of GDP scaled-up from NMP is presented in Table XII. Again, for details behind the estimate of housing rentals, the reader is referred to Appendix 5.

It should be noted that the estimate for 1975 valued at TTP is 182.0 billion Marks which barely differs from Wilkens estimate of 180.9 billion

Marks. This agreement is due to offsetting differences: Wilkens' estimate includes an addition 6.6 billion Marks worth of NMP allegedly produced by secret enterprises outside of the national accounts but his estimates of intermediate services to material production (which is deducted from NMP) is 5.2 billion Marks higher than that of this chapter. Further only depreciation of the housing stock is included as an estimate of value-added in the housing sector in Wilkens. Thus the difference between the Wilkens' assessment and the results of this chapter regarding the per capita national output per capita relative to West Germany can be traced mainly to differences in the method of converting from GDR Marks to DM.

C. Suggested Benchmark Estimates for GDP

In Table XV the sets of estimates of GDR national product from the production and final use accounts are compared. Having no strong reason to prefer one set of estimates over the other, the benchmark estimates for this chapter are the average of the two estimates in Table XVI. The proportions of consumption, investment, and government spending will be taken from the estimates in Tables X, XI and XII. Table XVI presents the resulting estimates which will serve as the basis of the estimates of per capita GDP in Marks, DM and, by way of the Kravis et al. binary US-FRG comparison for 1975, into US dollars.

IV. Purchasing-Power-Parities and Conversion to Dollar Estimates

A. GDR Marks to DM

1. Consumption. In Table XVII the often mentioned Otto-Arnold estimates of PPP are displayed for 1973, 1977 and 1981. Casual inspection of

the figures finds a dramatic spread between the calculated purchasing power parities depending on which country's budget shares are used as weights for the price relatives. Further the heavy subsidization of basic necessities as a measure of income redistribution is reflected in the relatively greater purchasing-power of the Mark for retired households in comparison to families of four. In addition, the spread between working/retired or FRG/GDR weighted PPP's are growing over time. Thus it appears that there is indeed a thorny index number problem involved in the selection from or aggregation of the numbers in Table XVII.

Less obvious perhaps is the problem of the economic interpretation of any one of the calculated PPP's. The conventional theory of price indexes and real income measures attempts to make sense of a world in which only the budget constraint delimits the opportunity set of households. As relative prices change, the budget constraint shifts. Utility maximizing households react to the relative price changes by substitution away from relatively more expensive goods and their complements. But the critical assumption is the absence of any quantity constraints through rationing or shortages to further delimit the opportunity sets of households. Significant quantity constraints are too important an aspect of consumer life in socialism to abstract away from. Households are not to be found at the tangencies of their budget constraints and indifference surfaces. Using the disaggregated data for 4 person wage and salary households in the GDR for 1977 and assuming that consumer preferences are the same in both Germanies, Collier (1983) has estimated the gap between effective and notional purchasing power of the GDR mark to be thirteen percent. A GDR family would be willing to give up thirteen percent of its total expenditure in order to achieve its notional

demands (i.e. its demand at <u>official</u> prices and subject to no other constraint than its budget).

Given the existence of such quantity constraints, what meaning does the calculation have to price the West German market basket in GDR prices? It is unlikely that an East German family could buy the West German consumption bundle even if it could afford it. At least, given the usual market assumption that goods are available in arbitrary quantities (for a single atomistic buyer) at existing prices, it would be feasible for a single household to buy the GDR market basket. The ratio of the cost of the observed West German market basket to the hypothetical DM cost of the GDR consumption bundle would give an index of real consumption with a corresponding PPP defined to be the ratio of the DM expenditures on the GDR bundle to the actual Mark expenditures for that bundle (See Collier (1983) for a diagramatic exposition).

For the case of the 4 person wage and salary households it is possible using the estimated utility function from Collier (1983) to compute the minimum D-Mark cost to achieve the level of utility which corresponds to the observed quantity-constrained consumption bundle of the GDR household. This "true" cost-of-living would have been 1256 DM for mid-1977 compared to the actual expenditure in the GDR of 1244 Marks. Thus the effective purchasing power of the Mark in 1977 would have been:

$$\frac{1256}{1244} \cdot 100 = 100.9$$

The purchasing power of the Mark relative to the GDR family of four consumption bundle grew 10.9% between 1973 and 1977 and another 7% between 1977 and 1981. Interpolation for the years 1975 and 1980 will give a rough

measure of the PPP for the consumption expenditures of GDR families of four of 96 for 1975 and 106 for 1980.

2. Investment. The next step is to find a reasonable purchasing power factor for investment goods. This is far easier said than done. In his Yale dissertation Peter Sturm/36 set about to compute a value of the GDR capital stock in West German prices. Sturm found Snell's attempt to do the same indirect enough to warrant another attempt./37 For his estimate of the price relative for capital equipment, Snell used realized export prices for GDR machiner. For a price relative for structures Snell used one Polish study which linked construction prices in Eastern Euorpe to that of the Soviet Union and another which compared Polish construction prices to those in the U.S. The circle was then closed by means of an OEEC comparison of the U.S. and Western Europe.

Sturm's construction component is based on unpublished data from the Statistisches Landesamt in Hessen on the cost of individual building operations and on price quotations in Special Publications of the Gesetzblatt der DDR (Legal Register). These were in turn deflated according to official price indexes back to 1962. Sturm's price relative for equipment came from prices given him by 85 West German enterprises (he approached 435 enterprises!) for a total of 145 products based on the technical specifications copied from official East German price catalogues. Scatter diagrams for the price relatives in four categories of equipment reveal a disappointingly large variance.

/36 Sturm (1974), Chapter 3.

/37 Snell (1970).

Comparing Snell and Sturm's price relatives for structures and equipment gives a nice indication of just how perilous this whole business can be (see Table XVIII).

Melzer/39 reports that the DIW attempted to obtain DM prices through West German and West Berlin firms for the limited selection of types of equipment listed in GDR price catalogues for 1972. Similar to the experience of Sturm, the DIW found that many of the West German firms contacted were unable to quote a DM price based on the specifications given. For those products which received price quotations a "rather considerable variance" of the prices was noted. It was further reported that there was no underline uniform pattern of either the West or East German prices being higher. Given the fear that products listed in a catalogue are biased towards standardized product lines and away from specialized product lines, Melzer decided not to use the information from that particular survey to determine a price relative for equipment./40

In the 1971 Report on the State of the Nation/41 for which the DIW had contributed the economic section, the GDR fixed assets were assumed to be priced 25% higher than the FRG prices in 1962 so that the GDR fixed assets

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/39 Melzer (1980), p. 115. Michael Keran believes that Melzer was referring to Sturm's research.

/40 In fact the implied price relative must have been so peculiar that Melzer did not even mention what the result of that survey was.

/41 Bundesminister fuer innerdeutsche Beziehungen (1971).

were deflated by a factor of 0.8 to obtain their DM equivalent. Melzer later

felt that this was too extreme and used a factor of 0.9./42

The implicit PPP for investment in Wilkens (1981) was 1.21 DM/Mark

1976. In 1967 the PPP was 0.91 DM/Mark. Lacking any better data, a PPP for

investment will be obtained by simple interpolation for 1975. Hence in 1975

the investment PPP is assumed to be 1.16 DM/Mark. Multiplying this factor by

the estimate for capital accumulation above/43 gives a rough estimate for 1975

of gross investment expenditures of 58.1 billion DM. This is about 3500 DM

per capita or 85% of the West German per capita level as calculated by the

International Comparison Project (ICP) of Kravis et al./44

3. Government. As in the calculation for total government

expenditure, the PPP here is based on an average of that of material goods and

labor costs.

The calculations to determine the PPP are documented in the notes to

Table XIX.

B. DM to Dollars

In Table XX the PPP's for the three components of final demand for the DM

and the U.S. dollar in 1975 and 1980 are given. The figures for 1975 come

from the Kravis et al. and the 1980 figures are extrapolations from the PPP's

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/42 Melzer (1980), p.116. The several paragraphs of explanation to this
estimate hardly give the impression that the bounds are tighter than
Sturm had set.

/43 Lurking somewhere in the background is the item "Capital Losses" for
which there are no published statistics available but which are not
likely to make up much more than one percent of NMP.

/44 Kravis et al. (1982), p. 257.

based upon the relative rate of inflation in the two countries measured by the implicit price deflators.

C. Per Capita Estimates

Combining the data from Tables XVI, XIX, and XX with the average population in the GDR for 1975 (16.85 million persons) and for 1980 (16.74 million persons), one derives Table XXI. According to Statistiches Bundesamt (1982) the per capita GNP for the West Germany was 16,641 DM and 24,107 DM for 1975 and 1980 respectively. Thus according to the calculations of this chapter the per capita national product of the GDR is approximately 70% of that of the FRG in both years. This is lower than the Wilkens-cum-Alton estimate of 76% and of course much lower than Wilkens' estimates for the late 1970's of over 80%.

The 1980 U.S. dollar estimate of the per capita national product of the GDR was about $6700.

D. Exchange Rate Conversion

For the sake of completeness the conversions by means of official exchange rates are presented in this section. In 1980 the noncommercial (tourist) exchange rate was 1.82 M/$ and can be explained simply as the manifestation of the GDR desire that its Mark be equal to the DM. Given the inelastic demand for visits to the GDR from the West--the recent increase in the daily minimum exchange for Western tourists, part of the price of a visit, led to an increase in revenues for the GDR, the only economic explanation of the noncommerical exchange rate is the theory of monopoly pricing. Nonetheless as can be seen from the implicit PPP from the $ estimate, the noncommercial rate

would (for this particular time) not have been the worst conversion factor.

The commercial exchange rate for 1980 was 3.3 VM/S. That would generate a figure of per capita GDP of $4000. One doubts that the per capita national product of the GDR is really 75% of Spain.

Table I: NMP METHODOLOGY, GERMAN DEMOCRATIC REPUBLIC

1. Material sphere includes:

    a) transportation and communication services for persons and public institutions not classified in the productive sphere.

    b) output of enterprises for washing and cleaning textiles.

    c) geological exploration.

2. Fixed capital accumulation:

    a) gross investment is calculated from investment reports rather than the fixed capital accounts for gross investment.

    b) changes in the stock of uncompleted investment projects are not included with changes in inventories and stocks; rather the portion completed during the reference year is classified with net investment in fixed capital.

    c) major capital repairs are not considered investment.

    d) investment in nonproductive sphere is treated like consumer durables, only gross flows are entered.

    e) livestock regarded as working capital.

3. Individual and Social Consumption:

    a) distinction by "character of consumption" (i.e. who consumes) and not by who finances.

    b) Depreciation of non-material capital not part of material consumption. E.g. depreciation of housing stock not part of individual consumption in NMPU.

4. Foreign Trade:

Regarded not part of material sector, i.e. cannot produce or realize national income.

Table II: GERMAN DEMOCRATIC REPUBLIC, STATE BUDGET: RECEIPTS

(Billion Marks)

	1970	1975	1976	1977	1978	1979	1980	1981
Receipts from socialist enterprises, Kombinate, VVB	38.0/a	70.3/b	71.3/b	78.3/b	81.5/b	84.7/a	97.6	99.6
1. Levy on fixed and working capital	5.9	13.3	14.3	15.5	16.0	16.8	18.2	19.8
2. Net profit tax	12.7	26.7	22.7	22.5	26.0	32.9	40.1	42.1
3. Product-specific turnover tax	19.4	30.3	33.8	34.7	35.3	35.0	39.3	37.7
4. Other receipts	—	.3/b	.5/b	5.6/b	4.2/b	—	—	——
Receipts from banking	—	3.4	3.7	4.3	5.0	5.3	6.1	6.8
Receipts from agriculture	1.2	1.3	1.1	1.4	1.3	1.4	1.4	1.2
Receipts from cooperatives (artisan, etc.)	3.0	2.6	2.6	2.7	2.7	2.9	3.1	3.3
Receipts from private artisans and businesses	6.8	2.4	2.4	2.4	2.5	2.7	3.0	3.2
Income taxes	3.6	5.3	5.5	5.9	6.2	6.6	6.8	7.2
Local taxes	.5	.5	.5	.5	.5	.5	.5	.5
Payments to state institutions (education, health, social services, culture) and state administration	4.3	6.7	6.2/c	6.7/c	7.4	7.8	8.3	8.6
Receipts of social security	8.8	11.8	12.2	12.7	14.3	14.9	15.2	15.7
Other receipts/d	4.4	10.2	12.1	9.6	11.2	13.8	18.7	21.4
Total budgetary receipts	70.6	114.7	117.6	124.5	132.6	140.6	160.7	167.5

/a Does not include item #4, "other receipts from socialist enterprises."
/b Other receipts from socialist enterprises for 1975-1978 taken from planned receipts.
/c Payments to state administration not included in 1976-1977 figures.
/d Receipts from socialist economy (not including agriculture, forestry, nor other food producing).
/e Residual receipts.

Source: Budget Reports (Haushaltsrechnungen) published as Anlagen zu Drucksachen der Bolkskammer der DDR (Appendix to the Sessions of the People's Chamber), as reprinted in DIW Wochenbericht, No. 5, 1978, p. 56 and Ibid., No. 33, 1980, p. 351. 1980 figures are taken from SJDDR 1981, p. 251. 1981 figures are taken from SJDDR 1982, pp. 248-251.

Table III: SUBSIDIES PAID FOR CONSUMER GOODS AND SERVICES

(Billion Marks)

	1970	1975	1976	1977	1978	1979	1980	1981
Food	4.8	7.2	7.4	7.4	7.7	7.7	7.8	11.2
Industrial goods	.4	1.2	2.4	2.7	2.9	4.4	5.1	5.4
Public transportation	1.1	2.2	2.5	2.6	2.7	2.7	2.9	2.9
Water treatment	.5	.5	.6	.6	.6	.7	.7	.5
Repairs and services	.5	.1	.2	.2	.2	.2	.3.	.3
Total (not including housing)	7.3	11.2	13.1	13.5	14.2	15.7	16.9	20.3
Housing and rent/a subsidies	2.4	4.3	4.6	5.5	6.2	6.7	7.2	8.4
Housing and rent/b subsidies	--	3.6	4.4	5.3	5.9	6.5	7.0	8.2

/a Total expenditure reported in state budgets.
/b Total expenditure less receipts for housing less investment (though including
    expenditures for repair work funded by local governments for repair and mainte-
    nance), cf. note in SJDDR 1974, p. 309.

Source: Same as Table II.

Table IV: SUBSIDIES PAID TO ENTERPRISES AND AGRICULTURE

(Billion Marks)

	1970	1975	1976	1977	1978	1979	1980	1981
Subsidies for socialist enterprises	3.6	5.0	5.9	7.0	6.5	6.3	7.1	7.6
Product-specific	3.6	5.0	3.8	4.2	4.5	5.2	6.1	6.9
Compensation for price changes	--	--	2.1	2.8	2.0	1.1	1.0	.7
Agricultural supports:	1.2	3.0	4.8	6.0	7.0	7.5	8.5	8.6
for improvements, investment, etc.	1.2	2.0	2.4	2.1	2.2	2.3	2.4	2.2
for product-specific subsidies	--	1.0	2.4	3.9	4.8	5.2	6.1	6.4

Source: See Table II.

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Table V: CONSTRUCTION OF A TIME SERIES IN CONSTANT 1970 PRICES

(Example)

Year	Price Base						Current Prices	Constant Prices
	1970	1971	1972	1973	1974	1975		
1970	100						100	100
	>5							>5
1971	105	110					110	105
		>2						>2
1972		112	116				116	107
			>1					>1
1973			117	119			119	108
				>2				>2
1974				121	125		125	110
					>0			>0
1975					125	127	127	110

Table VI: WILKENS' CALCULATIONS FOR TRANSITION FROM NMP TO GDP (1975)

NMP (official)	142.4 billion marks
+ correction for unreported economically active persons in the productive sectors	+ 6.6
National Income (MPS)	149.0
+ depreciation in the productive sector	+ 18.3
- intermediate service outputs for the productive sector	- 8.0
+ services (less material purchases)	+ 21.6
Gross Domestic Product	180.9

Source: Wilkens (1981), p. 12.

Table VII: LABOR FORCE BY BRANCH OFFICIAL STATISTICS AND DIW ESTIMATES, 1974

(thousands of workers)

Productive Branches

Industry	3519	3669	4.3
Fuel & power, water resources	229	259	13.1
Chemicals	359	359	0
Metallurgy	134	134	0
Building materials	103	103	0
Mech. eng./vehicles	980	1070	9.2
Elec. eng./electronics/ instruments	496	526	6.0
Light industry	625	625	0
Textiles	267	267	0
Food industry	326	326	0
Construction	606	646	6.6
Agriculture and forestry	946	946	0
Domestic trade	875	875	0
Other productive branches	237	237	0
TOTAL, productive branches	6808	6998	2.3

Nonproductive Branches

Finance, banking, etc,	78	78	0
Artisan services	71	71	0
Other private services	165	210	27.3
Health and welfare	406	421	3.7
Education and science	458	458	0
Other public services	329	619	88.1
TOTAL, nonproductive branches	1507	1857	23.2
TOTAL LABOR FORCE	8315	8855	6.5

Source: Wilkens (1981), p. 39. There is probably a typographical error for construction employment officially reported as '506'. A check of the SJDDR indicates that the figure must be more like '606' as reported above.

Table VIII: AVERAGE ANNUAL GROWTH RATES NMP AND GNP

	Official NMP	Wilkens GDP	Alton GNP
1960-1965	3.4%	3.5%	3.0%
1965-1970	5.2%	5.1%	3.1%
1970-1975	5.4%	5.1%	3.5%

Average annual growth rates figured by the following formula:

$$100 \cdot \sqrt[5]{\frac{X_t}{X_{t-5}}}$$

Sources: Official NMP: SJDDR 1979, p. 74.   Price base 1975.
Wilkens: Wilkens (1981), p. 152.   Price base 1975.
Alton: Alton (1982), Table 3.   Adjusted factor cost.

Table IX: GERMAN DEMOCRATIC REPUBLIC
WILKENS —CUM—ALTON ESTIMATE
1980 PER CAPITA GNP (DM)

	110.9 billion DM	Wilkens' estimate of 1967 East German GNP/a
times	1.4616	Ratio of GNP at adjusted factor cost for 1980 to that of 1967/b
=	162.096 billion DM	1980 East German GNP in 1967 prices
times	1.8996	Price change in the FRG from 1967 to 1980/c
=	307.918 billion DM	1980 East German GNP in 1980 prices
divided by	16.740 million	1980 East German population/d
=	18394 DM	Per capita East German GNP in 1980/e

/a Wilkens (1981), p. 69.
/b Alton (1982), Table III.
/c Change in implicit GNP deflator calculated from Statistisches Bundesamt
(1982), pp. 195, 197.
/d SJDDR 1982, p. 54.
/e Cf. West German per capita GNP in 1980 of 24107 DM (Statistiches Bundesamt
(1982), p. 197).

Table X: GDR CONSUMPTION EXPENDITURES

(billion Marks)

	1975	1980
Individual consumption (MPS)/a	94.1	119.5
Non-material services (excluding housing rentals). Paid by population/b	+3.1	+3.7
Housing rentals (paid and imputed)/c	+4.3	+4.4
Subsidies for consumer prices and tariffs/d	-11.2	-16.9
Subsidies for maintenance and repair of socialized housing stock/e	-.6	-1.2
personal consumption expenditures (SNA) at prices paid by households	89.7	109.5

/a   For 1975 see Table A2-I.   For 1980 the estimate of official NMPU from Appendix 3 (184.2 billion Marks) times the proportion published in SJDDR 1982 (.649).

/b   Estimate based upon the average relation between disposable monetary income of the population and household payments on non-material services for the years 1963-71 as published in Woelfling (1977). These payments were 6.1% of disposable monetary income of the population for that period.   For 1975 and 1980 the disposable monetary income of the population was 101.1 and 121.3 billion Marks respectively which is multiplied by .061 to obtain an estimate of payments for non-material services (including rent).
         Another reliable GDR source, Keck (1968) pp. 92-93, cites unpublished Central Statistical Administration figures that the percentage of disposable monetary income for non-material services in 1955, 1960 and 1965 were 6.1%, 4.7% and 4.6% respectively. Approximately half of the nonmaterial services were housing rentals. There is no obvious explanation for this discrepancy with Woelfling. Here the figures drawn from Woelfling are accepted because they are of more recent vintage. A deduction of 3.7 billion Marks (50%) from the 7.4 billion Marks calculated for 1980 was made to exclude rental payments.

/c   For 1980 see Appendix 5.   The estimate for 1975 scales-down the estimate for 1980 by the increase in the number of housing units from 1975 to 1980.

/d,e Budget fulfillment report for 1980 as published in Neues Deutschland, June 27/28, 1981. For 1975 figures as reported in DIW Wochenbericht 5/1978, p.56 with the figure for maintenance and repair estimated based upon proportions in 1980.

Table XI: GDR INVESTMENT EXPENDITURES

	1975	1980
Accumulation (NMP)/a	31.2	41.8
Depreciation/b	17.7	22.6
Major capital repairs/c	1.2	1.5
	50.1	65.9

/a   For 1975, Appendix 2.   For 1980, Appendix 3.
/b   Depreciation in productive sphere from SJDDR.
/c   Estimated following Melzer of DIW that capital repair
     was approximately 2.5% of investment.   See tables in
     Melzer (1980).

Table XII: GDR GOVERNMENT EXPENDITURES

(billion Marks)

	1975	1980
Social consumption (NMP)/a	15.0	22.8
Wage bill for government workers/b	16.9	22.3
	31.9	45.1

/a For the value of material goods and services consumed in 1975 see
   Appendix 2. For 1980 this is the product of the estimated NMPU
   from Appendix 3, 184.2, times the published share from the SJDDR
   1982.

/b Following Wilkens and updating his results. Government workers are
   divided into i) health and welfare, ii) education and science, and
   iii) other public workers. The small numbers estimated by Wilkens
   in banking and finance providing intermediate services have been
   ignored here. Employment figures for i) and ii) are taken from the
   SJDDR, other public workers assumed to be in the same proportion to
   categories i) and ii) as estimated by Wilkens for 1975, i.e,
   70.5%. Using Wilkens' estimates for monthly income of these three
   classes and increasing at the same rate that wages increased for
   full-time workers in the socialized sector of the productive sphere
   (an increase of about 24%), wage costs have been derived:

e.g. Government wage bill for 1980:

Health & Welfare	480	thousand workers	times	782M/month
+ Education and Science	535	"	" "	973M/month
+ Other Public Employees	715	"	" "	949M/month

Sum times 12 months times 1.24 (increase in wages) = 23.5 billion
                                                        Marks.

This in turn has been adjusted downwards by 5% to allow for the
difference between employment and full-time equivalents. See
discussion in Appendix 4.

Table XIII: GDR NET EXPORTS PLUS LOSSES

(Billion Marks)

	1975	1980
Net material product/a	142.4	187.1
Net material product utilized/b	-140.4	-184.2
	2.0	2.9/c

/a SJDDR 1981, SJDDR 1982.

/b Appendix 2 and Appendix 3.

/c Because the NMPU estimates can easily be off by a per-
centage point and possibly more, these differences are
very uncertain (the "true" difference could even be of
the opposite sign).

Table XIV: SCALING-UP FROM PRODUCED NET MATERIAL PRODUCT, GDR

(Billion Marks)

	1975	1980
NMP current prices/a	142.4	187.1
Depreciation and rental charges in productive sphere/b	+17.7	+22.6
Wage-bill in services/c	+19.0	+24.1
Housing rentals less repairs/d	+3.3	+3.4
Depreciation in nonproductive sphere (excluding housing)/e	+1.2	+1.4
Major capita repairs/f	+1.2	+1.5
Intermediate services to material production/g	-2.8	-3.7
GDP valued at TTP	182.0	236.4
Retail price and rental subsidy adjustment/h	-11.8	-18.1
GDP at market prices	170.2	218.3

/a,b   SJDDR 1981, SJDDR 1982.
/c   Wage bill in nonproductive sector. Calculated as follows:
  (i)   Officially reported employment in nonproductive sphere is multiplied by 1.24 (Wilkens' implicit ratio of total employment to officially reported employment in the nonproductive sphere.
  (ii) This term is multiplied by .95 to scale-down from employment to full-time equivalents, see Appendix 4.
  (iii) Multiply result from (ii) by the average wage (times 12 months) in the socialized sector of the productive sphere. Note that Alton, using Czechoslovakian wage relatives, calculates wages in the productive sphere 4% higher than in the nonproductive sphere. Wilkens, looking to the FRG for his wage relative, bases his calculations on wages and salaries being 5.4% higher in the nonproductive sphere. Therefore here it is simply assumed that the same average wage is paid in both spheres.

Table XIV: SCALING UP FROM PRODUCED NET
MATERIAL PRODUCT (Cont'd)

/d   For estimates of housing rentals, see Appendix 5 and the consumption
expenditure calculation above. Housing repairs would have been included in
NMP already so they are netted out: they are estimated at 1 billion Marks
in both years.

/e   Using Wilkens' estimate for depreciation in nonproductive sphere (excluding
housing) of 1.2 billion Marks for 1975. An increase of 200 million Marks
is assumed for 1980.

/f   For this adjustment see the calculation for investment expenditures above.

/g   Wilkens' estimate of intermediate services into material production is
5.4% of NMP which is far too high compared to any other socialist country
for which there are statistics. The only GDR source with a hint as to the
approximate order of magnitude of this item is Egerland (1964). This
source was cited for a similar adjustment in Snell and Harper (1970), where
the flow of funds from the productive sector to the banking system is
mistakenly considered part of the purchases of services by the productive
sector from the unproductive enterprise bank deposits. From the Egerland
flow of funds matrix, which corresponds roughly to 1959 or 1960 statistics
in the SJDDR, the input of nonmaterial services into production appears to
be only about 2% of NMP (as opposed to the 3.2% figure of Snell and
Harper).

/h   This adjustment is necessary to keep valuation of GDP consistent in market
prices for which purchasing power parities are available.

Table XV: COMPARISON OF TWO ESTIMATES OF GDR
NATIONAL PRODUCT

(Billion Marks, Current Prices)

	1975	1980
GDP from NMPU	171.7	220.5
GDP from NMP	170.2	218.3

Source: Tables X, XI, XII, XIV.

Table XVI: GDP BY END USE, BENCHMARK ESTIMATES

(Billion Marks, Current Prices)

	1975	1980
Consumption	89	109
Investment	50	65
Government	32	45
GDP	171	219

Source: Calculated from Tables X, XI, XII, XV.

Table XVII: PURCHASING POWER OF THE GDR MARK RELATIVE
TO THE D-MARK DIW CALCULATIONS

(If the D-Mark could buy 100 units
of consumer goods and services,
one GDR Mark could buy ... units)

Weights:	Early 1973		Mid-1977		Mid-1981	
	FRG	GDR	FRG	GDR	FRG	GDR
4 person wage/salary household	88	101	88	112	83	120
2 person retired household	105	125	104	126	98	130

Sources: DIW (1974), pp. 2540255, Otto-Charlotte (1979), DIW Wochenbericht Nr. 3, 1982, pp. 49-55.

Table XVIII: ESTIMATED PRICE RELATIVES
GERMAN EQUIPMENT AND STRUCTURES/a
1962

	Sturm	Snell
Structures	1.204 DM/M	1.026 DM/M
Equipment	.877 DM/M	1.337 DM/M

/a Sturm (1974), Chapter 3, p. 9.

Table XIX: PPP FOR GDP COMPONENTS

(GDR Mark/DM)

	1975 PPP	GDR Price Change	FRG Price Change	1980 PPP
Consumption/a	1.04			.94
Investment	.862/b	1.083/c	1.273/d	.733/e
Government/f	.638			.589

/a See the discussion in the text.
/b Implicit in Wilkens (1981), p. 104. Interpolated for 1975.
/c Plan fulfillment report as published in Neues Deutschland, Jan.
    17/18, 1981. There the figure for 1980 investment presumably in
    1980 prices including joint investment abroad, cf. SJDDR 1982) was
    reported as 56 billion Marks. The figure reported for investment
    valued in 1975 Marks in SJDDR 1981 was 51.7 billion Marks. Thus, an
    implicit 8.3% official increase in investment prices. This probably
    understates actual price increases for reasons discussed in the
    text. Cf. Appendix 3.
/d Ratio of implicit price deflators for investment 1980 and 1975.
    SJBRD 1981, p. 539.
/e This is (b) times (c) divided by (d).
/f Assumes the PPP for the material component of Government spending
    is the same as the PPP for investment. The PPP for government labor
    costs is assumed to be .45, the approximate relation between nominal
    wage levels.

Table XX: PPP FOR GDP COMPONENTS

(DM/$)

	1975/a PPP	FRG/b Price Change	USA/c Price Change	1980/d PPP
Consumption	2.355	1.216	1.430	2.43
Investment	2.961	1.273	1.476	2.55
Government	2.957	1.247	1.446	2.55

/a Kravis et al. (1982), p. 259. The geometric mean of the PPP's
    (DM/$) from the binary table Germany/U.S.
/b SJBRD 1981, p. 539. Ratio of the appropriate implicit price
    deflator in 1980 to that of 1975.
/c Economic Report of the President 1981, p. 236. Ratio of the appro-
    priate implicit price deflator in 1980 to that of 1975.
/d Column (a) times column (b) divided by column (c).

Table XXI: GERMAN DEMOCRATIC REPUBLIC
PER CAPITA GDP

(Marks, DM and U.S.$)

	Marks	DM	Dollars	Implicit PPP (M/$)
------------1975------------				
Consumption	5,300	5,100	1,800	3.0
Investment	3,000	3,500	1,200	2.6
Government	1,900	3,000	1,000	1.9
GDP	10,200	11,600	4,000	2.6
------------1980------------				
Consumption	6,500	7,000	2,900	2.3
Investment	3,900	5,300	2,100	1.9
Government	2,700	4,600	1,800	1.5
GDP	13,100	16,800	6,800	1.9

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APPENDIX 1

ESTIMATES OF THE LEVELS OF OFFICIAL NMPU, EXPORTS
AND IMPORTS IN 1967 DOMESTIC PRICES

In this appendix estimates are derived of the unpublished levels of NMP utilized (NMPU), exports and imports in constant 1967 domestic prices by combining information in the published coefficients of a GDR econometric model/1 with official data. These estimates are then compared to a second set of estimates in current prices for 1968 from the GDR final use quadrant of its input-output table./2 The estimates of the level of NMPU agree with those published by the DIW (1974) based on the same econometric model and a figure from a speech by W. Stoph./3 While the DIW has not revealed its method of estimating the level of NMPU in 1967 prices, this appendix demonstrates that these estimates of official data are very well founded. However, for some undisclosed reason, Wilkens does not seem to trust these figures./4 In light of the discussion below, his suspicion appears too cautious.

For the period 1963-71 one can derive estimates of the average level of exports and imports in constant (1967) domestic prices, taking advantage of the fact that the regression line estimated by the method of ordinary least squares passes through the means of the variables of the regression. If in fact an index of an unpublished time-series is available (such as for the

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/1 Bilow et al. (1974).

/2 Barthel et al. (1971).

/3 DIW (1974), p. 354.

/4 Cf. Wilkens (1981), "A rough approximation of global figures can be obtained by means of specific data culled from various sources," p. 65 which a footnote citing Bilow et al. (1974).

components of distributed NMP), it is child's play to solve the one equation for the one unknown, the missing base year of the index./5

The following equations are found in Bilow _et al._, p. 70:

(1) $EX_t = -7.8 + .1327\ BP_t$

(2) $IM_t = -6.7 + .722\ AC_t + .0734\ BP_t$

(3) $KI_t = -1.5 + .9797\ GE_t$ /6

(4) $GE_t = 13.1 + .6122\ NEP_t$

where EX are exports, BP is the GMO, IM are imports, AC is accumulation, KI is individual consumption, GE is disposable monetary income of the population,

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/5   Suppose a regression is run on Y_t and X_t where t refers to the observation number. Let the estimated regression coefficients be   and   for the constant term and the slope respectively. If we observe X_t, we can calculate the arithmetic average of X for the sample $SX_t/T = X*$, where T is the number of observations. Let the unknown average of the Y's equal Y*. Then because of the property of the ordinary-least-squares regression line that it passes through the means of the sample, one can solve for the unknown Y*:

$$Y* = a + b\ .\ X*.$$

Now if an index of Y_t is available, $Zt = 100, Y_t/Y_o$, where Y_o is the value of the series in the base year zero, the average of Zt is:

$$Z* = SZ_t/T = 100.\ .\ SY_t(T\ .\ Y_o) = 100\ .\ Y*/Y_o$$

Thus given the estimate of Y* and the average of the index (Z*), one can solve this last equation for the unknown value of the level of the series in the base year (Yo). Given Yo, one can convert the index series into an estimate of the Yt by simple multiplication $(\dot{Y}t = Y_o\ \cdot\ Z_t)$.

/6   In the original article the constant of the regression is reported without the minus sign. Fortunately, the academic law of the jungle operates in the GDR. Manfred Woelfling, in his contribution to Heinrichs _et al._ (1976), Vol. II, Chapter 9, section 9.5, recycles the same results as reported in Bilow _et al._, p.70. A minus sign is reported before the constant term which makes the results consistent (e.g. estimated average individual consumption to NMP used domestically). Nonetheless there is an object lesson to be learned here, namely, one has to contend with that Poisson distributed random variable, the typographical error.

and NEP is NMP all measured in billions of 1967 Marks. The subscript marks the annual observations 1963 through 1971.

Of the seven series only two had been available in level form until even the 1981 Statistical Yearbook. Those series were for the GMO and the NMP. Accumulation, individual consumption, and disposable income are available only in the form of index numbers. Only since the 1981 edition has the disposable monetary income of the population been published in the Statistical Yearbook in level form for the entire period. The point of this and the following two appendixes is to obtain estimates of the unpublished levels of the value of consumption and accumulation (MPS). Thus it is possible to use the fourth equation to check the method of combining published regression coefficients and index numbers for an unknown series to derive an estimate of the level of the unknown series. This check confirms that Bilow et al. indeed ran their regressions on the basis of official, unpublished data.

From the series on GMO and NMP at constant, 1967 prices published in the Statistical Yearbooks the average GMP for the period 1963 through 1971 was 232.818 billion Marks and the average NMP was 93.972 billion Marks. Together with equation (4) one can deduce that the average disposable monetary income of the population was 70.6 billion Marks. The actual average calculated from the 1981 Statistical Yearbook was 70.67778 billion Marks. This confirms the validity of the procedure. For the first three equations the actual average disposable monetary income of the population will be used.

While the index for the growth of imports and exports formerly published in the Statistical Yearbook is reportedly for constant prices, it would be prudent to assume that the series are based on constant foreign trade

prices since almost no data is published on foreign trade in domestic prices. Thus the best which can be hoped for, given the above data, are estimates for average exports and average imports for the period over which the regressions were run -- this need not be disheartening since there is no reason to make annual observations, which are just the average of four quarters, into a fetish. From the information it is also possible to construct an estimate for the NMP utilized.

Equation (1) can be solved directly to get an estimate for average annual exports of 23.1 billion Marks. This can be compared to the average value of exports in current, foreign trade prices which was 15.4 billion Marks. The implicit relation between domestic and foreign trade prices is 1.5 Mark = 1 VM. This is only approximate since the comparison involves constant 1967 domestic prices to current foreign trade prices. On the other hand, 1967 is sitting right in the middle of the sample period so that at least one observation should be accurate and the neighboring ones not terribly inaccurate./7

In order to obtain an estimate of imports in domestic prices it is necessary to skip to equation (3) from which one can derive the estimate of the average level of individual consumption of 67.743 billion Marks./8 The

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/7   Cf. Karl-Heinz Nattland, Der Aussenhandel in dem Wirtschaftsreform der DDR. Berlin: Duncker & Humblot, 1972, pp.15-16 who cites a couple of sources which put both rates at 1.5 for 1965. I am grateful to Michael Keren for this citation.

/8   After all the talk about uncertainties it might seem paradoxical to keep 3 figures after the decimal. While the error introduced into the estimate from the rounding of the constant terms remains relatively large, one can avoid biasing the point estimate by disregarding the knowledge of the product of the slope and GE. In any event the trimming of estimates to the proper number of significant figures is most important at the end of the calculations. The cost of carrying the extra few digits is trivial anyway.

index (base year 1960 = 100) for individual consumption is taken from the UN Yearbook of National Accounts Statistics, which is based on data in 1967 constant prices and which is accurate to one tenth of a percentage point as compared to the data in the Statistical Yearbook of the GDR which is rounded to the whole percentage point. The missing constant which relates the average value of the index (122.4) to the average value of the level of individual consumption is the level of individual consumption in the base year 1960. Dividing 67.743 by 1.224 gives the estimate of individual consumption for 1960 of 55.346 billion Marks. Since the share of individual consumption in NMP used in 1960 was 73.7%,/9 the estimate of NMPU for 1960 would be 75.1 billion. Marks.

This estimate can be checked against other estimates of NMPU obtained from other equations in different models in the above cited article. In fact, it is more direct to estimate the level of NMP used domestically by considering the following equation which was estimated for the period 1960 through 1970:

(5) $NEV_t = -1.56 + 1.0471 \; NEP_t$

which is a relation between NMP domestically used (NEV) which is known uniquely up to a missing constant (i.e. an index number) and the NMP produced (NEP) which is available in the Statistical Yearbook.

The average value of NEP in constant 1967 prices was 86.325 for the sample period of the regression so that the average value of NEV according to the coefficients of (5) was 88.831 billion Marks. Since the average value of

/9   U.N. Yearbook... or SJDDR.

the index for NEV was 118.85, the level of 1960 domestically used NMP can be given a second estimate of 74.74 billion Marks.

While the two estimates of NMPU differ by less than a half of a percentage point, the difference can <u>not</u> be accounted for by simple rounding errors. The latter estimate with the most extreme upward rounding errors possible would be only 74.76 billion Marks and the former estimate with the most drastic downward rounding errors would be no lower than 74.99 billion Marks. This confirms what one should suspect anyway, namely there are other sources of error besides the rounding error.

For the benchmark level of NMPU to be used in transforming the published official indexes into a series of NMPU in constant (1967) Marks, the average of the above estimates for 1960 will be taken: 74.9 billion Marks./10 This single piece of information may be used to transform the official index numbers and percentage shares of NMPU and its components into levels.

For example, to derive an average value for the level of accumulation, one first multiplies the growth index for accumulation (base year 1960 is 1.0) by the share of accumulation in 1960 NMPU. This product is then multiplied by 74.9 billion Marks, the estimated level of NMPU in 1960. Because of the long chain of calculations, the resulting figure for average accumulation from 1963 through 1971 is subject to greater error than the results up to now. Sensitivity tests indicate that the average value for

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/10 Which is <u>exactly</u> the number the DIW published in the earlier work cited in footnote 3 above. Hopefully the derivations here will convince the reader.

accumulation lies between 20.2 and 20.4 billion Marks. Still the estimate of 20.3 billion Marks for average accumulation is reasonably tight.

One is now in a position to solve the second equation above for the average level of imports during the sample period. The estimate for average imports in constant, domestic prices is 25.1 billion Marks. This compares to an average value of imports in (current) foreign trade prices of 14.8 billion Marks. This gives an approximate relationship between foreign trade prices and domestic prices for imports of 1.7 Marks = 1 VM./11

From Barthel et al. (1971) it is possible to obtain another estimate of the average conversion factor between domestic and foreign trade prices from the final use quadrant of a highly aggregated GDR input-output table for 1968. The Mark estimates are found in Table A1-I. Since the estimation of these numbers is fairly straight-forward, but the actual calculations rather tedious, the method itself will be broadly sketched to allow the reader a rough notion of what the raw data were.

The row totals for the intermediate flows quadrant (the second column in the table) and the final use quadrant are published twice in Barthel et al. (1971) in the detail seen in Table A1-I. In the first version (p. 99), the total for each commodity group to be disposed of either as material consumption, export or domestic final uses is set equal to 100%, and the percentage distribution for each use of the disposable product (domestic production + imports) is printed along the rows of the table. The second version of the table (p. 1000) sets each use of the disposable material output

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/11 Cf. footnote 7 above. It is also worth noting that "losses" never appear in the Bilow et al. model and which were probably aggregated into either imports or exports. See the discussion in the text, III.A.4.

equal to 100% and the columns show the percentage distribution across product groups.

These two versions can be combined into a single table with the total value of disposable material product (again, this is produced NMP + imports) set equal to 100. The remaining elements of the matrix are then equal to the ratio (times 100) of a particular commodity group in a given use to total disposable material output. To convert the derived table into the levels as seen in Table A1-I requires the knowledge of one single number, total disposable material output.

Fortunately, Barthel et al. (1971) provide enough information two pages later (p.102, all page numbers in this paragraph refer to Barthel et al.) to calculate the value of total disposable material output. It is necessary to combine the actual Mark values of material input-output flows between product groups with data on the percentages of "external use" for the same product groups from page 103. "External use" is defined to be that portion other product material output for a product group used by other product groups or for final use, e.g., for the industry 73.1% of the food production and imports went to other product groups or to final use with the remaining 26.9% involving transactions within the food industry. From the input-output table (p. 102) one finds that the intra-food industry flows amounted to 11.0 billion Marks in 1968. Thus for the food industry the disposable material output was equal to 11.0 ÷ 269 =.40.9 billion Marks.

The second version of the use of disposable gross material product (p. 100) gives the percentage distribution of GMO plus imports by product groups. The several product group totals can be used with these percentages to generate an estimate for the missing total. E.g. in the previous paragraph

the disposable material output from the food industry was calculated to be 40.9 billion Marks; since the food industry accounted for 15.2% of the total disposable gross material product, one estimate of this total disposable gross material product is 40.9 ÷ .152 = 269.03 billion Marks. Averaging the estimates obtained from the five branches for which data on "external use" is provided gives the estimate 269.1 billion Marks which is used in Table A1-I. The remaining elements of the Table were derived by multiplying this estimate of the total with the estimated percentage shares described two paragraphs above.

Table A1-I can be checked against the estimates of domestically used NMP derived earlier in this Appendix from the coefficients of the econometric model estimated by Bilow et al. (1974). In constant (1967) prices individual consumption in the NMPU accounts is estimated to be 69.5 billion Marks, social consumption to be 9.3 billion Marks, and changes in reserves and material stocks to be 1.0 billion Marks. These figures only deviate from those in Table A1-I by 0.1 billion Marks. This slight deviation could easily have been caused by the presumably small difference in prices between 1967 and 1978, rounding error, or even the possibility that the data used by Barthel et al. (1971) were provisional./12

From Table A1-I and data on exports in foreign trade prices, it is possible to derive a disaggregated picture of the relation between current domestic and foreign trade prices for exports. These conversion factors are

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/12 On the one hand 100 million Marks could by about 10,000 Trabants (the GDR's economy model car) which seems like quite a bit. On the other hand it would be silly to think that the official (secret) data is more accurate than one part in 1000 which is far better than an outside observer could long for.

present in Table A2-II. The results correspond with the average for the period of 1963-1971 which compared constant domestic prices with current foreign trade prices. The very high coefficient for the residual item can be explained by the relative smallness of that item so that there is undoubtedly a lot of noise in the calculated coefficient.

A recent GDR work on planning and efficiency/13 gives the following example which is relevant to the discussion here and the only recent reference to the average relation between foreign trade prices and domestic prices. In a numerical example, exports worth 42 billion Valuta Marks (which happen to be the actual level in 1977) are produced at a cost in domestic prices of 50 billion Marks. This implies a relation of 1.2 Marks = 1 VM.

/13 Ritchschke, G., H. Steeger and D. Hunstock (1981) as reviewed in Froehlich et al. (1982), p.777. What is interesting in the review is the attack of the reviewers on this particular number. They rhetorically ask if the authors are aware of such a number existing in fact and that rather it has to be approximately 1. It all depends how many decimal places one wishes to carry.

Table A1-I: USE OF DISPOSABLE GROSS MATERIAL OUTPUT PLUS IMPORTS, 1968

(Billion Marks, Current Prices)

Branch	Total	Material Consumption in Production	Gross Investment	Changes in Inventories and Stocks	Individual Consumption	Social Consumption	Exports
Total Industry	191.1	97.8	16.2	.6	48.9	4.5	23.2
Basic Industry	58.4	45.0	.4	-.2	5.1	1.9	6.2
Metal Working	58.1	24.3	15.3	.8	5.8	.9	11.1
Light Industry	33.6	15.4	.4	-.1	11.4	1.3	5.1
Food Industry	41.0	13.1	0	0	26.5	.4	.9
Construction	20.9	5.6	11.5	0	1.5	2.4	0
Agriculture and Forestry	25.6	18.6	.1	.4	5.9	.2	.8
Transport and Communications	11.6	7.5	.1	0	2.5	.7	.8
Domestic Trade	17.5	5.7	.1	.1	10.6	1.0	0
Other Productive Branches	2.7	1.2	.7	0	.4	.4	0
Total Disposable Material Product	269.1	136.5	28.6	1.1	69.6	9.2	24.4

Source: Calculated from Barthel et al. (1971), pp. 98-103.

Table A1-II: GDR EXPORTS IN DOMESTIC AND FOREIGN TRADE
PRICES, 1968

(Billion Marks, VM)

	Domestic Prices	Foreign Trade Prices	1VM =
Basic industries	6.2	3.6	1.7 M
Metal working industries	11.1	8.9	1.2 M
Light industry (including food processing)	6.0	3.1	1.9 M
Remaining products	1.3	.3	4.3 M
Total exports	24.5	15.9	1.5 M

Source: Exports in domestic prices: Barthel et al. (1971). See text for description of the calculations.

Exports in foreign trade prices: SJDDR 1969, pp. 296, 300.

Column 3 = Column 1 ÷ column 2.

APPENDIX 2

NMPU ESTIMATES, 1975 PRICES

The nineteen-sixties may well have been the heyday of published GDR statistics. The determination of the levels of NMP by final use becomes increasingly difficult as one moves to the present. To estimate the levels of NMP by final use in 1975 base year prices, the key to unlock the data is found in the relationship between the disposable monetary income of the population and NMP domestically used. For the year 1975 there is one GDR source which reports that the former is 72% of the latter./1

Since so much depends on a single piece of information, a word to justify any confidence in this information is in order. While the simplified schema for the production, distribution and use of the GMP in Ehlert et al. (1979) is not explicitly identified with any particular year, the percentages reported for the final uses of NMP are only consistent with the second edition of the same source (p. 316), the percentages reported there correspond to the year 1967. The choice of those two particular years is population and final use of NMP only makes sense in current prices, hence the choice of the two base years 1967 and 1975. It is important to note: first, that for 1967 and 1975 the ratios of disposable monetary income of the population to produced NMP were 75% and 71% respectively which is different from the 73% and 72% respectively reported in the two editions cited above. This helps establish the presumption that the relative size of disposable monetary income to domestically used NMP was intended. Secondly, at the time of publication of

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/1   Ehlert et al. (1979), p. 338.

the two editions very official statistics on the level of disposable monetary income had been published/2 so that there would have been no inconsistency at that time with publishing such percentages. Thirdly, the level of domestically used NMP in 1967 is consistent with disposable monetary income of the population being 73% is in fact 95.9 billion Marks (70.0 billion Marks divided by .73) -- rounding error puts the outer bounds at 95.2 and 96.6 billion Marks. From Appendix 1 it is possible to estimate 1967 NMPU directly as 95.7 billion Marks. This consistency of the estimates for 1967 increases the credibility of the later edition of Ehlert et al. for the 1975 figures./3

Comparing the average value of domestically used NMP with the average disposable monetary income of the population over the period 1963-71 according to the econometric model of Bilow et al. provides a final check of the reasonableness of this source. Dividing average disposable monetary income for that period (70.68 billion Marks) by the estimated average NMPU of 96.53 billion Marks, one gets 73%.

According to the 1981 Statistical Yearbook (p. 272), the disposable monetary income of the population was 101.1 billion Marks in 1975. Dividing this figure by .72 from Ehlert et al. (1979) generates 140.4 billion marks as the estimate of the domestically used NMP in 1975. The ratio of disposable monetary income of the population to NMPU is rounded to the nearest whole

/2 Net monetary income of the population was first published in level form in the SJDDR 1981. Earlier references to percentage changes and the equivalent absolute change were to be found in the appendices to the annual budget reports and some speeches.

/3 A word of caution concerning the second edition of Ehlert et al. is necessary. At that time accumulation was calculated differently so that the similarity of the results for NMPU in 1967 here might be a matter of "good" fortune.

percentage point, the "confidence interval" for NMPU in 1975 spans 139.4 to 141.4 billion Marks.

Taking the point estimate for 1975 and the official growth indexes, Table A2-I was calculated for the domestic end uses of East German NMPU by component. It is perhaps worth stressing that the structure of the offical data is precise enough that the major uncertainty of economic significance is due to the estimate of the 'missing' constant.

Table A2.I: GDR ESTIMATED "OFFICIAL" NMP BY FINAL USE

(Billion Marks, 1975 Price)

Year	NMP Utilized	Fixed Capital* Formation	Inventory and Stock Changes	Individual Consumption	Social Consumption for:	
					Population	Collective Needs
1960	73.0	11.0	2.3	53.7	2.4	3.5
1965	84.0	13.0	3.8	60.0	2.9	4.2
1968	95.5	18.2	1.0	67.3	3.8	5.2
1969	103.5	21.9	1.1	71.0	4.0	5.7
1970	111.1	23.0	4.1	73.8	4.0	6.2
1971	114.6	22.2	4.4	76.9	4.2	6.9
1972	120.7	22.9	4.3	81.4	4.7	7.4
1973	128.7	25.1	4.9	85.8	5.0	7.8
1974	136.5	26.2	5.4	90.8	5.7	8.4
1975	140.4	27.2	4.1	94.1	6.1	8.9
1976	148.3	28.9	5.1	98.2	6.6	9.6
1977	155.4	30.2	5.6	102.4	6.9	10.2
1978	157.4	30.9	2.8	105.9	7.1	10.5
1979	159.9	31.0	1.0	110.1	7.2	10.6
1980	167.7	35.4		114.4	7.4	10.4

* In material sphere: net investment.
  In non-material sphere: gross investment

Source: See text

APPENDIX 3

NMPU ESTIMATES, 1980 PRICES

Since the current five-year plan (1981-1985) uses 1980 prices for valuation, the NMP accounts have been made available in constant 1980 prices in both the Statistical Pocketbook and Statistical Yearbook of the GDR for 1982. Again the official statistics on NMP by final use are only published as a percent of NMP utilized or as index numbers. In order to estimate the levels of NMP utilized and its components, it is necessary to combine the estimates from the previous two appendices in 1967 and 1975 prices with figures in current prices cited at the 10th Party Congress of the Socialist Unity Party (SED) by Erich Honecker.

Unfortunately the figures cited by Honecker are not internally con-sistent so that this appendix is devoted to salvaging information which requires speculation. Since the estimates entail the use of Occam's razor in explaining this inconsistency, the relevant passages of Honecker's speech are reproduced here to allow the reader to judge the estimates of this appendix:

> Over the course of the last five year plan, a Net Material Product of 812.5 billion Marks was produced. Compared with the period 1971 to 1975 this was an increase of 172.1 billion Marks. Growth amounted to 25.4%...650 billion Marks were spent on individual and social consumption. 24.9% more than in the preceding five years... the large sum of 185.3 billion Marks was spent on accumulation.
>
> --Honecker (1983), pp.33-35

The footnote to the first figure states that figures are expressed in current prices.

First let it be noted that the three figures given for NMP and its change over the two five year plans are contradictory. The first two figures imply growth of 26.9% or 21.2% depending on whether growth is calculated from the total NMP for the period 1971-1975 or from the total for 1976-1980. While it

could simply be a coincidence, it turns out that by using the official statistics for NMP in 1975 prices, the actual growth of the NMP of the 1976-1980 plan over the previous five-year plan was exactly 25,4% (804.26 billion M divided by 641.18 billion M). The version of the speech published in Neues Deutschland has the same numbers so that the simplest explanation for the figure is that Honecker's speechwriter(s) mixed real and nominal NMP figures from tables and data supplied by the Central Statistical Office.

Assuming that the growth of 25.4% is for NMP in constant prices, the next step is to check the plausibility of the first two figures. This requires estimates of nominal (i.e. current price) NMP. Although the official statistics are only available in 1967, 1975 and 1980 prices for the 1971-1975 period and in 1975 and 1980 prices for the 1976-1980 period, one can generate reasonable estimates of NMP in current prices by interpolation. Assume that the increase in the price level between one base year and the next occurred at a constant annual rate. Next use that implicit annual rate of price change to inflate the quantity change taken from the offical series in constant prices. In Table A3-I the official series in constant prices can be seen together with the estimates of nominal NMP, for 1971-1980.

Examining the values for NMP in 1967 and 1975 prices, one can see that there was very little change in the official prices over that period so that the interpolation is probably fairly accurate. The total NMP for 1971-75 according to these estimates was equal to 640.47 billion Marks which is almost exactly equal to the implicit figure in Honecker's speech (812.5 minus 172.1). However, the estimate for total nominal NMP for 1976-1980 of 841.46 billion Marks far exceeds Honecker's total of 812.5 billion Marks. For the

sake of comparison it can be noted that the total NMP for 1976-1980 in 1975 and 1980 prices was respectively 804.3 and 862.5 billion Marks.

The most drastic departure from the assumption of a constant, continuous change of prices between 1975 and 1980 would be for all prices to have changed in a single year. The lower bound for the total nominal NMP, of 1976-1980, assuming away any years with a fall in the price level, would be constant 1975 prices through 1979 with the entire price increase occuring during 1980. This lower bound could have also been achieved through a mistaken addition of a figure in current prices to a readily available series in constant prices! Such a lower bound would amount to 817.5 billion Marks—5 billion Marks higher than the sum cited by Honecker. Allowing for the fact that Honecker's 1980 statistics were probably preliminary estimates is _not_ enough to close this gap. To estimate the likely size of such an error between provisional and revised figures, one can use the difference between preliminary and revised 1980 NMP which indicate a slight underestimation by the preliminary figures. In the 1981 Statistical Yearbook the growth rate of real NMP between 1979 and 1980 was 4.1% vs. 4.4% calculated from the series published in the 1982 Statistical Yearbook -- care must be taken here since the former growth rate was calculated from real NMP valued in the prices and structure of 1975 and the latter rate from real NMP valued in the prices and structure of 1980 so that the figures are not entirely comparable. Still such a difference would only amount to about 600 million Marks.

To summarize the appendix to this point, it seems that the wrong number in Honecker's speech was the total NMP for 1976-1980. A plausible explanation for the slip, recognizing that sufficiency is not the same thing as necessity, would be that either an arithmetic or a typographical error

slipped into a draft version of the speech so that 812.5 billion Marks appeared rather than a number appproximately thirty billion Marks larger. Once made, the error was carried through to the next round when a number was calculated for the difference betweem the two five-year plan totals. How could such a slip go undetected? In the preceding paragraph it was seen that the figure cited by Honecker falls between the sums in constant prices for the two base years, 1975 and 1980. Thus the figure of 812.5 billion Marks is still on the ball-park, if out in left-field. Furthermore, the usual way NMP statistics are considered is on an annual basis so that given the complications caused by economic growth and changing prices, the figure for a five year sum is probably not nearly as well known. One could imagine the difficulties of the task of reconstructing the US national income accounts based on presidential speeches and news conferences.

Assuming that the correct figure for total nominal NMP for the period 1976-1980 was indeed 841.5 billion Marks, the next point to be settled is the plausibility of Honecker's other figures for NMP by final use? First note that the proportions of NMPU over the last five-year plan implicit in Honecker's remarks were 22.2% for accumulation and 77.8% for consumption. These figures are most reasonable. In 1975 prices the proportion of NMPU for accumulation over the period 1976-1980 was 21.7% whereas for 1980 prices the same proportion was 23.0%. It should be emphasized here that these proportions can be calculated using only the officially published data and are therefore independent of the particular estimates of the levels.

To derive an estimate for 1980 NMPU in current prices, one begins with the estimates of NMPU in 1975 prices from Appendix 2 and assumes, as was done earlier in this appendix, a uniform annual rate of change of the implicit

price deflator over the period 1976-1980. Letting P equal the value of the deflator in 1976 (with $P_{75} = 1.0$), one can solve for P at a solution of the fifth order polynomial:

$$835.3 = 148.3P + 155.4P^2 + 147.4P^3 + 159.9P^4 + 167.7P^5$$

where 835.3 billion Marks is the sum of nominal NMPU over the period 1976-1980 according to Honecker's speech (185.3 + 650) and the coefficients on the right-hand-side are the NMPU's in 1975 prices for 1976 through 1980. The value of P is approximately 1.0189 which implies an estimate of NMPU for 1980 in current prices of 184.2 billion Marks (= 1.01895 times 167.7). From the 1982 Statistical Yearbook one can take the reported shares of accumulation and consumption to derive estimates of accumulation and consumption for 1980 in current prices of 41.8 and 142.4 billion Marks, respectively.

Next combining the new estimates of 1980 nominal accumulation and consumption with the previous estimates of the components of NMPU in 1975 prices, one is able to derive implicit price deflators for accumulation and consumption. The implicit price deflator for the accumulation component of NMPU in 1980 is 1.1808 (= 41.8 billion Marks divided by 35.4 billion Marks). The implicit price deflator for the consumption component is 1.0772 (= 142.4 billion Marks divided by 132.2 billion Marks). Thus the estimates of nominal accumulation and consumption imply that the implicit price deflator for ascumulation is 9.6% higher than for consumption in 1980 (again, in 1975 the two deflators are equal to 1.0). In other words, the average annual rate of inflation over the period 1975-1980 was about 1.9% higher in accumulation than in consumption.

2. Second Estimates

For the sake of completeness the implicit price deflators for accumulation and consumption can be calculated directly by combining

Honecker's figures with the estimates of the two series in 1975 prices. Again assuming constant inflation rates for each of the components of NMPU over the period, the estimates of average price inflation are derived as the solution of fifth order polynomials. For consumption the estimating equation, where P_k is the one year deflator for consumption, is:

$$650 = 114.4P_k + 119.5P_k^2 + 123.5P_k^3 + 127.9P_k^4 + 132.2P_k^5$$

The coefficients of the right-hand-side are the estimates of annual consumption in 1975 prices for the years 1976 through 1980. The 650 billion Marks is the sum of consumption in current prices over 1976 through 1980. The 650 billion Marks is the total of nominal consumption as claimed by Honecker. P_k is calculated to be 1.0168 which amounts to an implicit price deflator for consumption in 1980 of 1.087 (= 1.0168^5). This is a full percentage point higher than calculated above by first estimating the NMPU in 1980 at current prices and taking the published proportion of NMPU used in consumption. The estimate of consumption expenditures in 1980 at current prices by this method is 143.6 billion Marks (= 132.2 times 1.0168^5) or 1.2 billion Marks higher than the first estimates of this appendix (still a difference of less than 1%).

For accumulation the estimating equation, with P_a as the one year deflator for accumulation, is:

$$185.3 = 34.0P_a + 35.8P_a^3 + 33.7P_a^3 + 32.0P_a^4 + 35.4P_a^5$$

185.3 billion Marks were reported by Honecker to be the five year sum of accumulation valued at current prices and the coefficients are the annual estimates of accumulation valued at 1975 prices for 1976 through 1980. From this equation the estimate of the average annual change in the price deflator for accumulation is derived of 2.71% so that the implicit price deflator for 1980 is estimated to be 1.143 (=1.0271^5). The second estimate of nominal

accumulation in 1980 is thus 40.5 billion Marks. It will be recalled that the first estimate above was 41.8 billion Marks.

This second set of estimates for nominal accumulation and consumption when added together gives a second estimate of nominal NMPU for 1980 of 184.1 billion Marks which only differs from the first estimate above by 0.1 billion Marks. This implies a share of accumulation in NMPU of 22.0% compared to the share published in the Statistical Yearbook 1981 at 22.7%. Also the ratio of the implicit price deflators for 1980 accumulation to consumption is 1.053 which is considerably below that derived above from the published shares in the 1982 Statistical Yearbook (i.e. 1.0981). This inconsistency seems unaccountably large and does suggest that there is still plenty of room for improving the estimates in this appendix.

The second estimate of the implicit price deflator for the accumulation component of the 1980 NMPU seems closer to about the only published shred of evidence on the magnitude of the price changes. In the 1980 plan fulfillment report/1 total investment expenditures (including joint ventures abroad) were reported for 1980 to have totalled 56 billion Marks. The same figure in 1975 prices as reported in the 1981 Statistical Yearbook was 51.7 billion Marks. Since these investment figures are gross and the accumulation figures are net of depreciation in the productive sector, 22.64 billion Marks are deducted to obtain net investment./2 Computing the implicit price deflator for net investment in 1980, one finds a 14.8% rise in net investment valued in 1980 prices compared to 1975 prices. This is closer to

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/1 Neues Deutschland, January 17/18, 1981.

/2 Estimate assuming that the sum of depreciation and related charges as a percentage of fixed assets was the same in 1980 as it was in 1981 for which provisional statistics were published in SJDDR 1982.

the second estimate above where the implicit deflator for accumulation was calculated at 14.3% than the first estimate of 18.1%.

3. Assessment of NMPU Estimates for 1980

Before concluding this appendix, it is worth noting that the 24.9% growth of consumption for 1976-1980 over 1971-1975 claimed by Honecker is most likely derived from constant price series. Valued in 1975 prices the pubbished index for consumption shows a growth of 24,8% which is not significantly different from the figure cited by Honecker, allowing for rounding error. The estimated rate of inflation for consumption is large enough that even assuming absolute price stability from 1971 to 1975, the growth of consumption under the five-year plan 1976-1980 in current prices would be far larger than the 25% reported by Honecker. This is all consistent with the remarks concerning the growth of NMP at the beginning of this appendix.

For the estimates of GDR national product in the main text above, the first set of nominal NMPU estimates of this appendix have been chosen. A few remarks justifying this choice are called for. Recall that the two 1980 nominal NMPU estimates of this appendix are virtually identical. The choice between the two sets of estimates boils down to a choice between the estimates of the proportions of accumulation and consumption in NMPU. The first set of estimates are consistent with the proportions of the national accounts published in the 1982 Statistical Yearbook. The share of accumulation is taken straight from the published data. The fact that the first estimate for the rise in prices for the accumulation component of NMPU is over three percentage points higher than that implied for net investment is perhaps due to the differences between accumulation and net investment (inventory changes). It must be emphasized that since the estimate of the time series of

the level of NMPU valued at 1975 prices is subject to error(as high as one billion Marks in either direction roughly speaking), the high growth rates might reflect an underestimate of the levels of constant price NMPU.

While the estimates for consumption and accumulation for 1980 in current prices could be refined further to improve consistency between past and present estimates, nonetheless it does appear that the totals cited by Honecker for accumulation and consumption from the 1976-1980 five-year plan are broadly consistent with what is already known (the estimates of the previous two appendices and published statistics) to allow further estimates based on these totals.

To repeat: for 1980 in current prices the estimate of NMPU is 184.2 billion Marks, of which 142.4 billion Marks for consumption and 41.8 billion Marks for accumulation. Conditional on the accuracy of Honecker's figures, it would he surprising if these estimates are much over one percentage point in error.

Table A3.1: GERMAN DEMOCRACTIC REPUBLIC
NOMINAL AND REAL NET MATERIAL PRODUCT
1971-1980

(billion Marks)

		Real NMP		Nominal NMP*	
	1967 prices	1975 prices	1980 prices		
1971	113.6	114.45	122.64	114.18	
1972	120.1	120.93	129.57	120.72	
1973	126.8	127.65	136.83	127.50	640.47
1974	135.0	135.78	145.68	135.70	
1975	141.7	142.37	152.78	142.37	
1976		147.52	158.06	149.69	
1977		155.21	166.04	159.81	
1978		160.76	172.18	167.96	841.46
1979		166.90	179.15	176.94	
1980		173.87	187.06	187.06	

*Estimated for 1971-1974, 1976-1979.

Source: 1967 base prices, SJDDR 1976; 1975 base prices, SJDDR 1981;
1980 base prices, SJDDR 1982; Nominal NMP, see text.

APPENDIX 4

ALTON AND ASSOCIATES: A FEW CHECKS

At the Research Project on National Income in East Central Europe much of the guesswork in patching the gaping holes in official statistics has been replaced with the preferred method of using the available relations and structures observed in one planned economy to fill in the holes of another economy. While there can be no doubt that such practices leave much to be desired, at least they satisfy the scientific requirement of permitting the results to be duplicated and moreover possess a documentable, empirical basis for the calculations. It is easy enough to believe that the substitution of Hungarian, Czechoslovakian, or Polish relations for unobserved GDR relations will affect the results. It is very difficult to judge the adequacy of the substitutions. If there were easily available, appropriate GDR data to judge them, Alton and associates would never have bothered with indirect estimates in the first place. In the course of the research for this chapter some bits of information bearing on a few assumptions in the Alton and associates' calculations were found and are reported in this appendix. Depending on one's natural inclination towards optimism or pessimism, these results are at best suggestive though hardly conclusive.

To obtain an estimate of returns to labor, Alton et al. (1981) multiply the official employment statistics by average annual earnings to which an estimate of social security contributions paid by employers is added. Concerning the employment figures there are two sources of error which are at least partially offsetting. On the one hand, if the DIW estimates of underreporting of employment are accurate, then even allowing for the armed forces, one would find that Alton's estimates of labor would be almost ten percent too low. On the other hand, the annual wage figure is based upon

full-time work and the employment statistics make no adjustment for parttime work. In GDR planning and statistical practice, labor force statistics are also gathered in nominal full-time employees. In Gruihn and Lange (1971) there are figures for NMP per full-time employee. Comparing the available figures for NMP and actual employment in the material sectors of the economy, one finds that the ratio of full-time equivalents to total labor force was 97.5% in 1960 which has continuously decreased to 93.8% in 1970. This is consistent with an estimate obtained from Koziolek that the ratio of full-time equivalents to labor force, this time for the entire economy in 1976, 90-92%./1 Thus it appears that these two possibilities for error just about cancel each other at the aggregate level. Only if part-time employment and underreporting of labor are highly correlated across branches would it be likely that these errors would not affect the branch results, i.e, the eventual weights for aggregating branch growth indexes.

To calculate the net returns to capital and land for the GDR in 1975, Alton et al./2 needed an estimate of the sum of working capital and the depreciated value of fixed capital. The GDR published (this too is one of the many deletions at the industrial branch level in the Statistical Yearbook of late) the value of fixed capital at full replacement value (nominally 1966 prices, in fact 1962 prices). The step to depreciated value of fixed capital is made by taking the known ratios by branch for Hungary and Czechoslovakia for depreciated value of fixed capital to replacement value. The next step

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/1 Koziolek (1979), p. 134. He reports that 350,515 full-time equivalent employees were equal to 4.8% of the labor force of 1976. From this one can calculate the implied range of full-time equivalents to be 7.23 to 7.38 employees.

/2 Alton et al. (1981), pp. 48-49.

was to distribute the working capital across sectors in relation to depreciated fixed capital as in Hungary.

Conceivably there is someone in the East Berlin office of the State Central Administration for Statistics who could judge the accuracy of the Alton and associates' estimates of working capital and the net value of fixed capital. A few data from the mid 1960's are available to check these results. In particular, Alton et al. estimate the ratio of working capital to fixed capital at full replacement value as 43%. The Hungarian data apparently include unfinished investments in working capital. For the GDR in the years 1965 through 196?, the ratio of working capital to fixed capital (not including unfinished construction) went from 18.4% to 20.3%./3 From the Woelfling econometric model of the GDR, it is possible to derive the average value of unfinished investments for 1962-70 of 16.4 billion Marks which is 7.2% of the average stock of fixed assets for the period./4 From these sources it would appear that the GDR ratio was more like 25-30% as opposed to the 43% for Hungary.

More recently data on working capital has been published in an article by Ackermann et al./5 For 1978 the ratio of working capital to fixed capital was calculated to be 23%. From these few available figures it appears that the implied stocks of working capital behind the Alton calculations are about 25% too high.

/3 Gruihn and Lange (1971), p. 39.

/4 Toutenberg and Roedel (1978), p. 72 who publish the coefficients to the capita formation submodel of Woelfling which are not all published in Woelfling.

/5 J. Ackaermann et al. (1982), p. 1142 where figures for the turnover of fixed and working capital for 1960 and 1978 are given.

To give an example where the Czech-connection proved surprisingly accurate, consider the value of fixed capital in the housing sector. There Alton et al. use the ratio of fixed capital in housing to industry of 66.9% to generate an estimate of 154.6 billion Marks for 1975. For 1972 a GDR source reports that 72% of fixed capital in the nonmaterial sphere was used to satisfy the "housing need-complex",/6 This in turn implies a value of fixed capital in 1966 prices of 142.4 billion Marks. If one adds to that sum the gross investment in new housing construction as listed in the SJDDR for 1973 through 1975, the resulting estimate of fixed assets in housing is 150.9 billion Marks (65.9% of the fixed capital in industry). This is also consistent with a figure from Neues Deutschland cited by Wilkens of 140 billion Marks worth of housing assets in 1972./7

/6 Knoblauch et al. (1980), p. 226.

/7 Neues Deutschland, Oct. 4, 1973 p. 4 quoted in Wilkens (1981), p. 42:
"Since this figure seems wildly out of proportion for the housing stock, one is forced to the conclusion that the range of 'community amenities' included must be extremely broad." No justification for this statement is offered. On the other hand the value of fixed assets in housing stock privately owned is not included in the figure.

APPENDIX 5

HOUSING RENTRALS

An estimate for the total value of housing rentals for the GDR at current prices for 1980 is the goal of this appendix. This total will include imputed rentals for owner-occupied housing.

The stock of housing units for June 30, 1980 can be estimated by linear interpolation between the stocks reported in the housing census of January 1, 1978 and December 31, 1981./1 This gives an estimate of 6525 thousand units. Comparing the average number of rooms per housing unit for the last major housing census (January 1, 1971) with that of December 31, 1981, one finds that the number increased slightly from 2.7 rooms per unit to 2.8 rooms./2 For the sake of simplicity assume that the average rooms per unit to be 2.8 in 1980 as well. From the 1% sample of housing for April, 1978 in the FRG one can obtain the average monthly rentals by number of rooms for private and publicly supported housing which can be used to estimate the rental for a housing unit with "2.8" rooms -- 285 DM./3 According to Manfred Melzer at the DIW, in mid-1978 the average housing unit in the FRG was 79 square meters compared to 58 square meters in the GDR./4 The results of the

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/1 SJDDR 1982, p. 158 and SJDDR 1981, p. 148.

/2 Kitchens are not counted in the room total for GDR housing statistics.

/3 The figures have been adjusted by subtracting one room (for the kitchen, which is counted as a room in the FRG statistics) from all units with two or more rooms. The next step was to average the rents for publicly supported and private housing using their relative proportions as weights. Finally the GDR rental was estimated by linear interpolation between the average FRG rental for two and three room units of 231 DM and 297 DM, respectively. These data can be found in the SJBRD 1981, p.220.

/4 Manfred Melzer, "Wohnungsversorgung und Wohnungsqualitaet in der DDR," DIW Wochenbericht, No. 30, 1978, p. 291.

1% sample of FRG housing in 1978 indicate that average rentals increase about 3.4 DM per extra square meter for the range of units between 40 and 120 square meters. This would amount to a deduction of 71.4 DM from the monthly rent to allow for the smaller size of GDR housing units. Thus an average monthly housing rental of a GDR-size housing unit is calculated to be 214 DM/month. Using the price index for housing rentals in the FRG,/5 this figure is inflated by the percentage increase in prices to derive a mid-1980 value of 232 DM. This is probably still too high since the proportion of housing units with bathing or shower facilities in the GDR in 1982 was roughly that of the FRG in 1968 (almost 70%)./6 This might be reflected in the DIW purchasing power comparison for housing rentals though this cannot be established from the published materials of the DIW.

/5 SJBDR 1982, p. 37.

/6 6Neues Deutschland (December 24, 1982) p. 1 reported that 4.5 million housing units (as of November 1982?) had either bath or shower facilities. The housing stock as of the end of 1981 was about 6.6 million units. For the FRG, cf. the summary of the housing census of October 25, 1968 published in SJBRD 1970, p.241.

The purchasing power parity for housing rentals was estimated at about 4.13 DM = 1 M for mid-1980./7   This gives an estimated average rental value of 56 Marks per housing unit. According to the official GDR statistics on household expenditures and receipts, the average wage and salary family spent slightly more than 4o Marks per month for housing rental payments. To the extent that people own their own homes, the rental paid by wage and salary households on average would be less than the average monthly rental. Apparently the GDR does not extend the monetary balances of the population to include imputed rental payments, so that such a difference implies about 30% of wage and salary households own their own homes.

Does 30% make sense? As part of its housing program, the GDR has encouraged construction of private homes and indeed 10% of the new housing units built since 1971 were for housing built by private parties. This must certainly be far below the proportion of private ownership of the existing housing stock.   The population of the GDR is relatively dispersed when compared to the FRG -- the percentage of population in 1980 in communities of less than 3000 inhabitants was almost 30% in the GDR and less tha 10% in the FRG -- so that dwellings for one or two families make up a significant portion

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/7   7Based upon the geometric averages of the FRG weighted and GDR weighted PPP's in each year for four-person wage and salary households and for two-person retired households respectively. These two categories were combined into a single PPP using 80% for the wage and salary households and 20% for the retired households (the approximate shares of population above and below retirement age). For mid-1977 the PPP for housing was 1 GDR Mark =3.7 DM and for mid-1981 it was 4.26 DM. This 15.7% increase in the PPP of the GDR Mark for housing rentals is roughly the same as the observed inflation in housing rentals in West Germany of 16.4% for the same period, indicating very stabile housing rentals in the GDR as expected. It must be noted here that the housing PPP in the DIW calculations lack all documentation save, "Calculations of the DIW". This stability could also be due to such an assumption by the DIW with its estimate of the housing PPP extrapolated forwards with an FRG price index. See Otto-Arnold (1979) and DIW Wochenbericht, No. 3, 1982.

of the housing stock.   Therefore the rent controls which make owning multiple-
unit dwellings unprofitable would not undermine the private ownership of
smaller dwellings in the countryside.   In one West German source it was
claimed that 70% of the housing stock even in the 1960's was privately
owned./8   Since this figure includes owner-occupied housing togther with the
stock of dwellings privately rented, the difference between average
expenditures for rental payments by wage- and salaried households and the
estimate of average housing rentals seems reasonable, given the uncertainties
involved in every step of the calculations.

Combining the estimates of the stock of housing and average rentals,
a total value of housing rentals (imputed and paid) can he calculated derived
at 4.4 billion Marks.

/8   A bis Z: Ein Taschen- und Nachschlagebuch ueber den anderen Teil
     Deutschlands, edited by the Bundesministerium fuer gesamtdeutsche Fragen,
     11th ed., 1969, p. 741.

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