

IMF Working Paper

© 1998 International Monetary Fund

This is a *Working Paper* and the author(s) would welcome any comments on the present text. Citations should refer to a *Working Paper of the International Monetary Fund*. The views expressed are those of the author(s) and do not necessarily represent those of the Fund.

WP/98/45

INTERNATIONAL MONETARY FUND

Research and Fiscal Affairs Departments

Output Decline in Transition: The Case of Kazakhstan

Prepared by Mark De Broeck and Kristina Kostial¹

Authorized for distribution by Graham Hacche and Liam Ebrill

April 1998

Abstract

This paper presents a detailed analysis of the output decline in Kazakhstan in the early years of the transition. The decline is documented at the aggregate and sectoral levels, and the quality of the available data is reviewed. A growth accounting framework quantifies the productivity slowdown in Kazakhstan and illustrates how excessive capital accumulation under central planning has contributed to the output decline. In addition, strong evidence is found that disorganization and inherited sectoral misallocation have played a significant role. Credit contractions and reductions in aggregate demand may have had an effect, but clear patterns of causality cannot be established.

JEL Classification Numbers: O47, P24

Keywords: Transition economies, output decline, Kazakhstan

Authors' Email Address: mdebroeck@imf.org; kkostial@imf.org

¹We are grateful to the Kazakh statistical authorities and to Micha Belkindas, Timothy Hleniak, Vincent Koen, Kornélia Krajnyák, Sanja Panth, Phillip Swagel, George Tsibouris, Patrick Paul Walsh, and Jeromin Zettelmeyer for helpful discussions and comments. The opinions expressed in this paper are those of the authors and do not necessarily reflect the views of the IMF.

| CONTENTS | | PAGE |
|---|--|-------------|
| Summary | | 4 |
| I. Introduction | | 5 |
| II. Output Developments During the Transition: An Overview | | 5 |
| III. Output (Mis)measurement | | 10 |
| IV. Factor Inputs and Total Factor Productivity | | 12 |
| V. Why did Output Decline so Much? | | 17 |
| A. Disorganization | | 17 |
| B. Sectoral Misallocation | | 26 |
| C. Credit Contraction | | 31 |
| D. Reductions in Aggregate Demand | | 35 |
| VI. Conclusion | | 37 |
| Appendix I. Agricultural Sector | | 39 |
| Appendix II. Data: Sources, Definitions, and Adjustments | | 50 |
| References | | 74 |
| Text Tables | | |
| 1. Kazakhstan: Output Developments, 1990-95 | | 6 |
| 2. Kazakhstan: Computations of Total Factor Productivity for the Whole Economy, 1970 to 1995 | | 16 |
| 3. Kazakhstan: Production and Productivity by Sector | | 19 |
| 4. Kazakhstan: Production and Productivity by Sector in Industry | | 20 |
| 5. Kazakhstan: Sectoral Shares in Employment, Value Added, and Wages | | 28 |
| 6. Kazakhstan: Sectoral Shares in Employment, Value Added, and Wages in Industry | | 29 |
| Text Figures | | |
| 1. Kazakhstan: Indices of Production | | 7 |
| 2. Kazakhstan: Output | | 9 |
| 3. Kazakhstan: Employment | | 13 |
| 4. Kazakhstan: Investment | | 14 |
| 5. Kazakhstan: Real Wages | | 18 |

| | | |
|----|--|----|
| 6. | Kazakhstan: Dispersion of Output Changes in Industry | 25 |
| 7. | Kazakhstan: Real Money and Credit Variables | 32 |
| 8. | Kazakhstan: Real Interest Rate | 33 |

Appendix I (Agricultural Appendix) Tables

| | | |
|----|---|----|
| 1. | Kazakhstan: Agricultural Output, 1980-1995 | 42 |
| 2. | Kazakhstan: 5-year Average Output for Crops, 1990-1995 | 43 |
| 3. | Kazakhstan: Inputs for Crop Production, 1980-1995 | 44 |
| 4. | Kazakhstan: End-period Livestock Inventories, 1990-1995 | 45 |
| 5. | Kazakhstan: Crop Yield, 1980-1995 | 46 |
| 6. | Kazakhstan: Annual per Capita Food Consumption, 1980-1995 | 47 |
| 7. | Kazakhstan: State Procurement of Agricultural Products, 1980-1995 | 48 |
| 8. | Kazakhstan: Profitability Indices, 1990-1995 | 49 |

Appendix II (Data Appendix) Tables

| | | |
|-----|---|----|
| 1. | Kazakhstan: Production Indices for Selected Industrial Commodities, 1980-1995 .. | 55 |
| 2. | Kazakhstan: Electricity Use, 1990-1995 | 57 |
| 3. | Kazakhstan: Electricity Use in Industry, 1990-1995 | 58 |
| 4. | Kazakhstan: Computations of Total Factor Productivity for the Agricultural Sector, 1970 to 1995 | 59 |
| 5. | Kazakhstan: Computations of Total Factor Productivity for the Construction Sector, 1970 to 1995 | 60 |
| 6. | Kazakhstan: Computations of Total Factor Productivity for the Industrial Sector, 1970 to 1995 | 61 |
| 7. | Kazakhstan: Computations of Total Factor Productivity for the Transport and Communications Sectors, 1970 to 1995 | 62 |
| 8. | Kazakhstan: Computations of Total Factor Productivity for the Trade and Procurement Sectors, 1970 to 1995 | 63 |
| 9. | Kazakhstan: Interstate Deliveries for Selected Commodities, 1991-1995 | 64 |
| 10. | Kazakhstan: Energy Balances, 1980-1995 | 66 |
| 11. | Kazakhstan: Turnover of Workers in Basic Sectors, 1992-1995 | 67 |
| 12. | Kazakhstan: Sectoral Investment Shares, 1990-1995 | 68 |
| 13. | Kazakhstan: Sectoral Investment Shares in Industry, 1990-1995 | 69 |
| 14. | Kazakhstan: Profitability of Enterprises in Real Terms, 1993-1995 | 70 |
| 15. | Kazakhstan: Bank and Interenterprise Arrears in Real Terms, 1992-1995 | 71 |
| 16. | Kazakhstan: Outstanding Bank Loans, 1991-1995 | 72 |
| 17. | Kazakhstan: Evolution of the Consolidated Budget, 1992-1995 | 73 |

SUMMARY

This paper, on the basis of a detailed analysis of the available evidence for Kazakhstan during 1991-95, sheds new light on the causes and dynamics of the sharp output decline in the wake of the breakdown of the Soviet economic system. According to revised official estimates during this period, output in Kazakhstan dropped by around 40 percent. The paper surveys output and general economic developments during the transition, reviews the quality of the available data, and analyzes the causes of the output decline. The Kazakh data, while suffering from significant shortcomings, nevertheless make it possible to obtain a fairly accurate picture of output and its determinants at the outset and during the early years of the transition. The causes of the output decline appear to be diverse and complementary, and reflect both the legacy of central planning and factors specific to the transition.

Growth accounting applied to Kazakh data for the last two decades of central planning shows that the country inherited an economy where capital accumulation had been excessive and productivity growth had turned negative, and suggests that part of the output decline can be explained as a correction to the inefficiently high production levels at the outset of the transition. Correcting another legacy of central planning, severe sectoral misallocation due to an administratively imposed relative price structure, added to the downturn.

In addition to the initial aggregate and sectoral distortions, a number of transition related factors have contributed to the output decline. Partly as a consequence of continuing government interference, in interstate trade especially, the move from central planning toward market based input and sales linkages resulted in significant short-run output disruptions. Credit contractions and reductions in aggregate demand, cuts in government expenditures in particular, may have had an effect, but clear patterns of causality cannot be established.

I. INTRODUCTION

The output decline in the Baltics, Russia and the other countries of the former Soviet Union, following the breakdown of central planning and the disintegration of the Union greatly exceeded expectation: average output in 1995 was more than 40 percent below its level five years earlier. The explanations of the output decline in transition countries discussed in the literature, for instance in Mundell (1997), are wide-ranging. According to a number of studies, the decline is mainly a statistical artifact, reflecting coverage and reporting problems. Other explanations emphasize the role of disorganization and corrections to sectoral misallocation following the breakdown of central planning. Finally, the effects of a credit contraction and reductions in aggregate demand also figure prominently.

The objective of this paper is to present a careful analytical study of these explanations on the basis of a case study for Kazakhstan. An effort was made to systematically collect a wide range of data covering the last years of the pre-transition period and the transition years through 1995, the last year of the output decline in the country. Thus, we can verify in a detailed way all the main hypotheses put forward in the literature. A number of findings emerge from this analysis. First, the available data, while suffering from substantial shortcomings in many areas, are sufficiently accurate to enable one to make a meaningful analysis of output developments in the early years of the transition. Second, excessive capital accumulation, disorganization and inherited sectoral misallocation all appear to have played a significant role in the output decline. Finally, credit contractions and reductions in aggregate demand may have had an effect on output, but clear patterns of causality cannot be identified.

The paper is organized as follows. Following a description of broad output developments in Section II, Section III discusses data issues. In Section IV, a growth accounting framework is presented to document productivity developments pre- and post-transition and clarify the role of capital overaccumulation. Additional explanations of the output decline are discussed in Section V, and Section VI contains some concluding remarks. An appendix gives an overview of developments in agriculture, a key sector, and discusses data issues, including adjustments to the data.

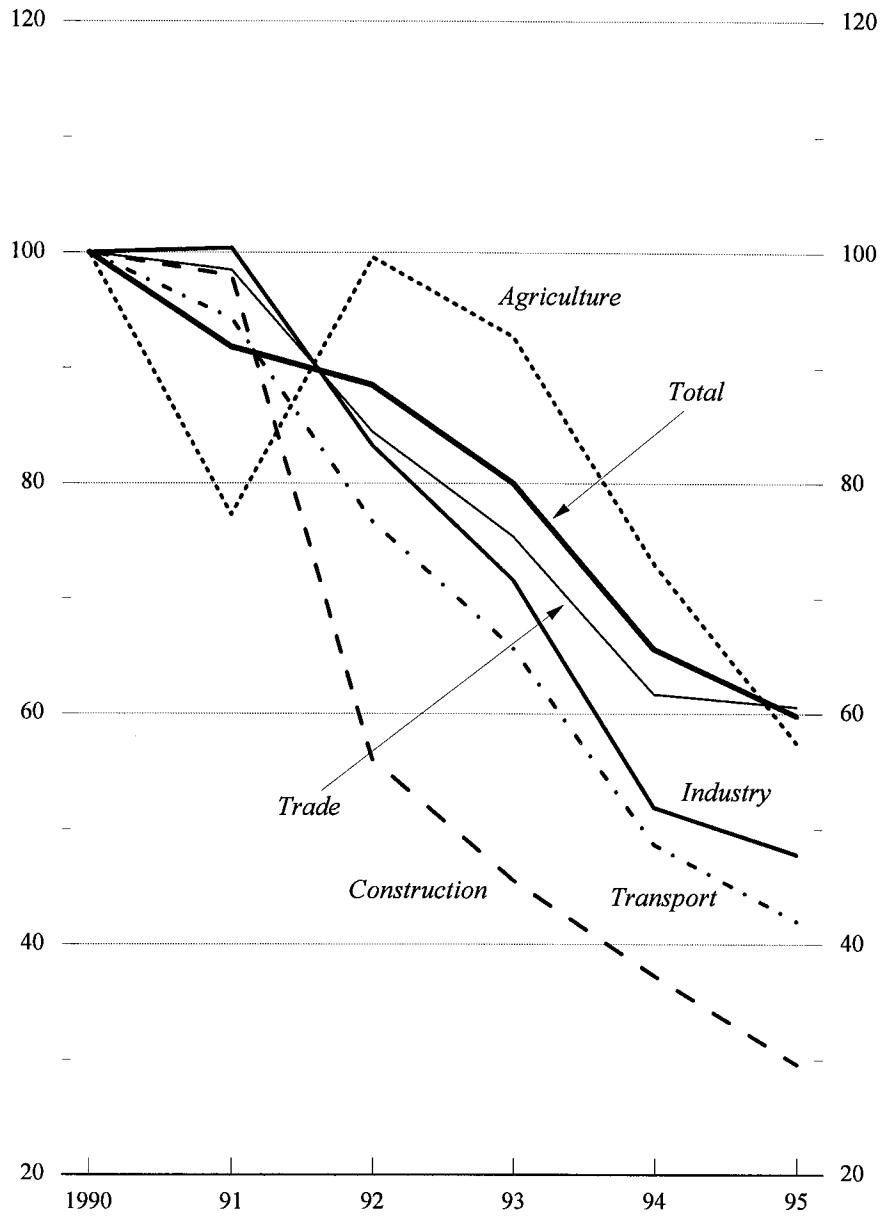
II. OUTPUT DEVELOPMENTS DURING THE TRANSITION: AN OVERVIEW

Output performance in Kazakhstan began to weaken in the 1980s, reflecting the deteriorating growth performance of the Soviet economic system as a whole. The unfolding disintegration of the Soviet Union in 1991 had an additional negative impact on economic activity. The economic downturn intensified during the early years of the transition, and was most severe in 1994. According to revised official estimates, by the end of 1995, total output had dropped to around 60 percent of its 1990 level, with the cumulative decline in industry amounting to over 50 percent and in construction to over 70 percent (see Table 1 and Figure 1). While output decline persisted throughout 1991-95, the pattern of decline and the

Table 1. Kazakhstan: Output Developments, 1990-1995
(growth rate, and 1990=100)

| | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 |
|---|-------------|-------------|--------------|--------------|--------------|-------------|
| Total output (value added) | | | | | | |
| Growth rate | | | | | | |
| Total | -0.9 | -8.2 | -3.6 | -9.6 | -18.0 | -8.8 |
| Industry | -5.0 | 0.4 | -17.0 | -14.0 | -27.5 | -7.9 |
| Agriculture | 12.3 | -22.7 | 28.8 | -6.9 | -21.3 | -21.2 |
| Construction | -8.1 | -2.0 | -42.8 | -18.7 | -18.2 | -20.6 |
| Transport and communicatio | -1.6 | -5.7 | -18.7 | -14.3 | -25.9 | -13.8 |
| Trade and procurement | 1.4 | -1.5 | -14.2 | -10.8 | -18.2 | -1.8 |
| 1990 = 100 | | | | | | |
| Total | | 91.8 | 88.5 | 80.0 | 65.6 | 59.8 |
| Industry | | 100.4 | 83.3 | 71.6 | 51.9 | 47.8 |
| Agriculture | | 77.3 | 99.6 | 92.7 | 73.0 | 57.5 |
| Construction | | 98.0 | 56.1 | 45.6 | 37.3 | 29.6 |
| Transport and communications | | 94.3 | 76.7 | 65.7 | 48.7 | 42.0 |
| Trade and procurement | | 98.5 | 84.5 | 75.4 | 61.7 | 60.6 |
| Industrial production (gross output) | | | | | | |
| Growth rate | | | | | | |
| Total | -0.8 | -0.9 | -13.8 | -14.8 | -28.1 | -8.2 |
| Electricity | -1.4 | -0.9 | -6.2 | -4.4 | -15.2 | -1.6 |
| Fuels | -3 | 2.5 | -5.9 | -14.8 | -14 | -12.3 |
| Ferrous metallurgy | -0.2 | 6.2 | -9.6 | -24.4 | -29.5 | 11.7 |
| Nonferrous metallurgy | -10 | -5.7 | -4.5 | -7.8 | -22.8 | 3.8 |
| Chemicals and petrochemical | -0.3 | -5.1 | -26.9 | -44.6 | -41.1 | 3.6 |
| Machine building and metal | -3 | 2.4 | -16.3 | -14.7 | -37.1 | -27.8 |
| Forestry, woodworking, pap | 1.4 | 2.7 | -14.4 | -8.7 | -44.9 | -40.7 |
| Construction materials | -2.2 | 1.3 | -16.9 | -26.8 | -57.1 | -31.8 |
| Light industry | 1.5 | 2.5 | -21 | -11.7 | -44.3 | -58.8 |
| Food industry | 2.2 | -6.7 | -27.5 | -13.7 | -26.1 | -20.7 |
| 1990 = 100 | | | | | | |
| Total | | 99.1 | 85.4 | 72.8 | 52.3 | 48.0 |
| Electricity | | 99.1 | 93.0 | 88.9 | 75.4 | 74.2 |
| Fuels | | 102.5 | 96.5 | 82.2 | 70.7 | 62.0 |
| Ferrous metallurgy | | 106.2 | 96.0 | 72.6 | 51.2 | 57.2 |
| Nonferrous metallurgy | | 94.3 | 90.1 | 83.0 | 64.1 | 66.5 |
| Chemicals and petrochemicals | | 94.9 | 69.4 | 38.4 | 22.6 | 23.5 |
| Machine building and metalworking | | 102.4 | 85.7 | 73.1 | 46.0 | 33.2 |
| Forestry, woodworking, paper | | 102.7 | 87.9 | 80.3 | 44.2 | 26.2 |
| Construction materials | | 101.3 | 84.2 | 61.6 | 26.4 | 18.0 |
| Light industry | | 102.5 | 81.0 | 71.5 | 39.8 | 16.4 |
| Food industry | | 93.3 | 67.6 | 58.4 | 43.1 | 34.2 |

Figure 1. Kazakstan: Indices of Production
(1990 = 100)



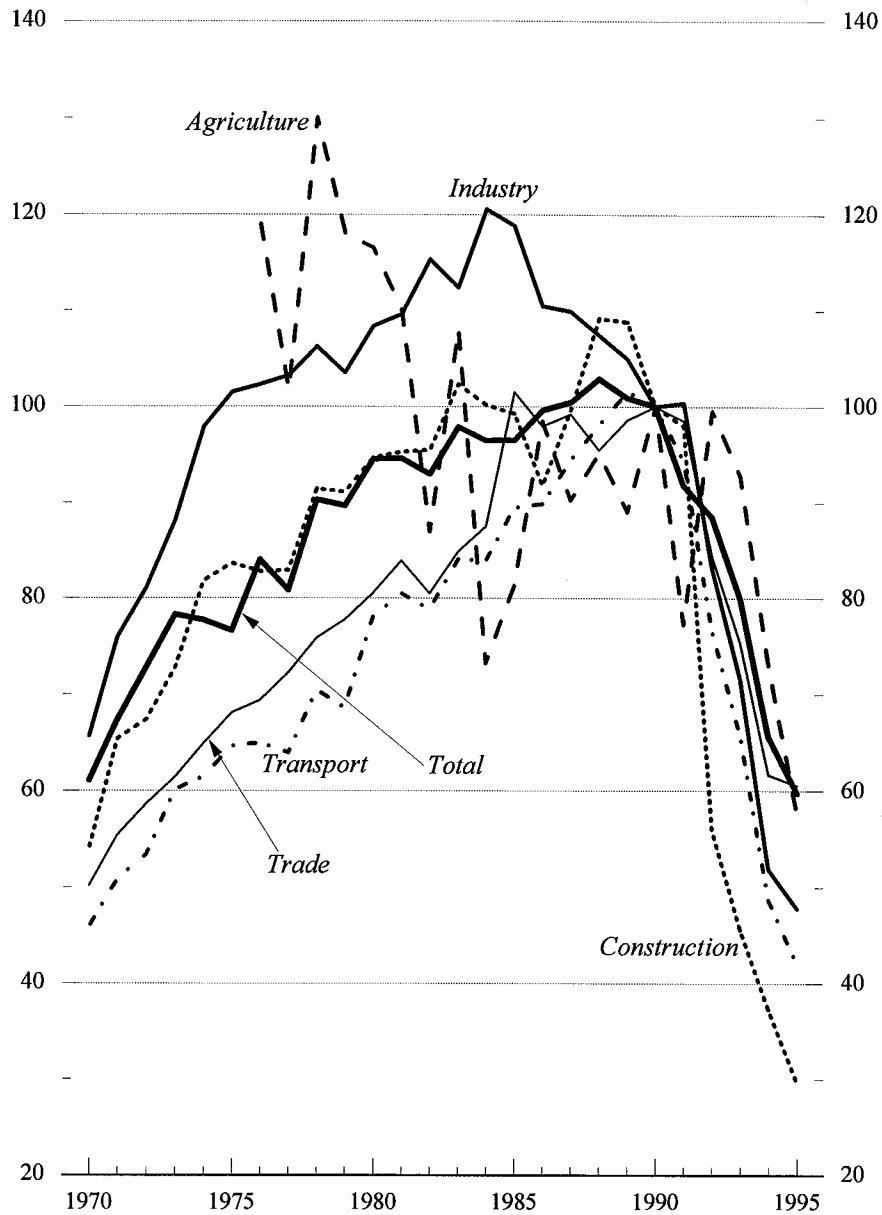
policy responses evolved, as the following overview illustrates (see Figure 2, and International Monetary Fund, 1992, 1993, 1994, 1996 and 1997).

Following a decline by about 8 percent in 1991, inter alia reflecting a sharp fall in grain production and the dissolution of the Soviet Union, the output decline temporally slowed in 1992. Accompanying a large-scale price liberalization in January 1992, the Kazakh government adopted policies aimed at mitigating the negative output consequences of the transition. Financial policies were aimed at maintaining participation in the ruble zone, and were, in line with the Central Bank of Russia's policies, relaxed in the second half of 1992. The government also continued to control a significant proportion of production, as well as internal and external trade. Output fell moderately, by about an additional 4 percent. All major sectors recorded contractions, except agriculture, where a bumper grain harvest boosted production by almost 30 percent. Industrial production dropped by about 17 percent, with deep slumps in the chemical, petrochemical and food industries, and construction activity fell by more than 40 percent.

The output decline accelerated in 1993. Kazakhstan continued to participate in the ruble zone in the first half of the year, and financial policies remained lax. However, the Central Bank of Russia in the middle of the year decided to demonetize pre-1993 ruble notes in Russia, thereby intensifying financial instability and forcing the Kazakh authorities to eventually introduce a new currency in mid-November. At the same time, and throughout 1993, government efforts to target production and secure supply links continued. Output fell across all sectors by, on average, 10 percent, with strong declines in construction, and trade and procurement in particular. Steep output drops in chemicals and petrochemicals and construction materials contributed to an overall downturn in industry of about 14 percent, while the decline in agricultural output mainly reflected a lower grain harvest relative to the record 1992 level.

Output performance deteriorated sharply in 1994, during the first quarter in particular, and the year-on-year decline was around 18 percent, the worst outcome over the 1991-95 period. The industrial and transport sectors recorded output declines of more than 25 percent. Agriculture, in which the cumulative contraction had been limited during 1991-93, declined by more than 20 percent, as policies to support the sector with cheap financing were eliminated. The decline in industrial production was, as in previous years, unevenly spread across sectors. While increased export opportunities maintained demand for ferrous and nonferrous metallurgy, the machine-building and construction materials sectors almost collapsed. Severe input problems further afflicted the chemical and petrochemical industries, and light industry was increasingly unable to cope with import competition. At the same time, and following a first unsuccessful attempt that was derailed in early 1994 by an arrears clearing operation, the authorities began to implement a financial stabilization program from the middle of 1994 on, and the monthly inflation rate was reduced from an average of around 30 percent in 1993 to 10 percent in December 1994. Government intervention in production and supply was also curtailed, while privatization programs in industry and agriculture started in earnest.

Figure 2. Kazakhstan: Output
(1990 = 100)



Output continued to decline in 1995, although at a much reduced rate. Tight monetary policies resulted in financial stabilization, and the government made further progress toward limiting direct interference in the economy. While severe contractions were still recorded in agriculture and construction, industrial production started to show the first indications of stabilization, as the year-on-year decline was reduced to around 8 percent. Also, for the first time since 1991, positive output growth was recorded in some sectors of industry: metallurgy production increased in response to strong export demand, and chemicals and petrochemicals production rebounded from the severe slump in previous years.

III. OUTPUT (MIS)MEASUREMENT

The officially reported output decline is steep, but part of it may be a statistical artifact reflecting shortcomings in the official statistics.² The Kazakh National Statistical Agency (KNSA) encountered numerous methodological problems in the derivation of real output indicators while moving from the Soviet statistical system to the 1993 System of National Accounts. These difficulties were compounded by the effects of high inflation and persisting distortions in relative prices, since the measurement of changes in real output involves issues such as the choice of the appropriate weighting scheme to aggregate sectoral physical output indicators and the computation of the share of intermediate consumption in gross output. As a result of these problems, initial output estimates suffered from various inaccuracies.

The KNSA came to recognize that the initially reported output decline for the early years of the transition had likely been overestimated, and in 1995 took the initiative to re-estimate the real output numbers for the 1991-94 period, in cooperation with the World Bank (World Bank, 1997a).³ The new official estimates of real output developments, which reflect both methodological corrections and adjustments for incomplete coverage and underreporting, show a cumulative decline during 1990-94 of 35 percent rather than the previously estimated 50 percent. The revised estimates display the same overall trend as the initial numbers and confirm the sharp decline in 1994. However, they are quite different with regard to the 1991-93 year-on-year changes.⁴

²See for instance Winiacki (1991), who, inter alia, argues that the elimination of the central plan reduced incentives for state-owned enterprises to overstate output so as to meet or exceed the plan targets.

³For a similar study on the Russian Federation, which arrived at comparable conclusions, see World Bank (1995).

⁴The most far-reaching change was the revision of the agricultural output index for 1991-93. The original index was constructed using the average annual 1983 Union prices as weights, while the new index used the annual average prices of the year before. The 1983 average

(continued...)

To verify the official revisions, we made independent calculations for the industrial and agricultural sectors. For industry, a monthly production series for the 1991-95 period was constructed with volume data for 57 major industrial commodities, using as weights the share of each commodity in 1994 value added (annual output data are reported in Appendix Table 1).⁵ This series, on an annual basis, is similar to the KNSA revised numbers. For agriculture, an annual production index was computed, applying 1994 average prices to physical volume data for 12 major commodities (see also Agricultural Appendix Table 1). The computations confirm the substantial impact of changes in the weighting scheme for agriculture, and corroborate the authorities' revisions.

The revised official output estimates may still inadequately adjust for incomplete coverage and underreporting. To improve coverage for industry, the KNSA has begun to include estimates of production by small enterprises, resulting in somewhat minor changes, except for food processing.⁶ While incomplete coverage appears to be a relatively minor issue in industry, it requires major attention in other sectors, agriculture, trade, and services in particular. Underreporting, on the other hand, is considered to be widespread in all sectors, but no estimates of its importance are available.⁷

In the absence of more specific information, divergent developments in electricity consumption and reported output may serve as an indicator of coverage and reporting

⁴(...continued)

prices undervalued grain, and as a result, the major decline in grain production in 1991 as well as the particularly good crop in 1992 were not reflected into the old index.

⁵KNSA's computations differ from our computations in three respects: they (1) include physical volume data for more than 200 (as compared to 57) commodities; (2) are based on average unit values as aggregation weights; and (3) use the annual average prices of the year before. Since prices were only gradually moving to market determined levels following the early 1992 price liberalization, using prices of the preceding year in computing the output index biases the aggregation scheme, particularly in the initial years of the transition. In the absence of a full set of 1995 data, 1994 price data appear to be the best proxy for unbiased weighting.

⁶According to the series adjusted for incomplete coverage, industrial output including production by small enterprises declined by around 8 percent in 1995 rather than by around 10 percent. No adjustments were made for heavy industry, and small upward changes were applied to output in the construction materials and light industry subsectors. In the food processing subsector, however, the rate of decline was adjusted from 37 percent to 21 percent to take account of incomplete coverage.

⁷See Kulekeev (1997).

problems.⁸ Aggregate electricity consumption has declined significantly less than output during 1990-95. More disaggregated data, however, indicate that this discrepancy should not necessarily be attributed to deficiencies in output data. The more limited decline in overall electricity consumption partly reflects the maintenance of high consumption in the municipal sector and increasing network losses, while the differences between movements in electricity consumption and reported output in the major production sectors and most industrial sectors do not appear to be out of line with reductions in the efficiency of energy use to be expected during transition (see Appendix Tables 2 and 3).⁹ The revised official output estimates are therefore maintained as the basis for the further analysis in the paper.

IV. FACTOR INPUTS AND TOTAL FACTOR PRODUCTIVITY

The output decline during transition reflects substantial reductions in inputs of capital and labor and a sharp productivity drop. Productivity growth in the Soviet economy began to decline in the two decades preceding the eventual breakdown of the system in the early 1990s. Real output growth slowed as high rates of capital accumulation could not be maintained and as productivity gains were insufficient to offset the declining contribution of growth in the capital stock.¹⁰ During the early years of the transition, capital accumulation in Kazakhstan plummeted, while employment was also significantly reduced and productivity dropped sharply (see Figures 3 and 4). A growth accounting framework makes it possible to determine what fraction of the fall in output can be accounted for by reductions in inputs of the factors capital and labor and how much by a decline in total factor productivity.

The growth accounting framework, which is based on a number of assumptions about the production function, decomposes changes in output into contributions from different factors of production, and a residual, total factor productivity (TFP), which can be interpreted as a measure of the efficiency with which resources are employed. In more formal terms, the growth of output Y can be expressed in terms of the growth of the individual factor inputs capital K and labor L as:

$$\ln[Y_t/Y_{t-1}] = \theta_K \ln[K_t/K_{t-1}] + \theta_L \ln[L_t/L_{t-1}] + TFP_{t-1,t} \quad , \quad (1)$$

⁸Authors such as Kaufman and Kaliberda (1996) strongly advocate the use of electricity consumption as a proxy for actual output.

⁹The sharp fall in the output/electricity ratio in the light industry and food sectors in 1994-95 is, however, an indication that even the revised official estimates fail to adequately capture production by small private sector enterprises.

¹⁰See Pizter and Baukol (1991), and Easterly and Fischer (1995).

Figure 3. Kazakhstan: Employment
(1990 = 100)

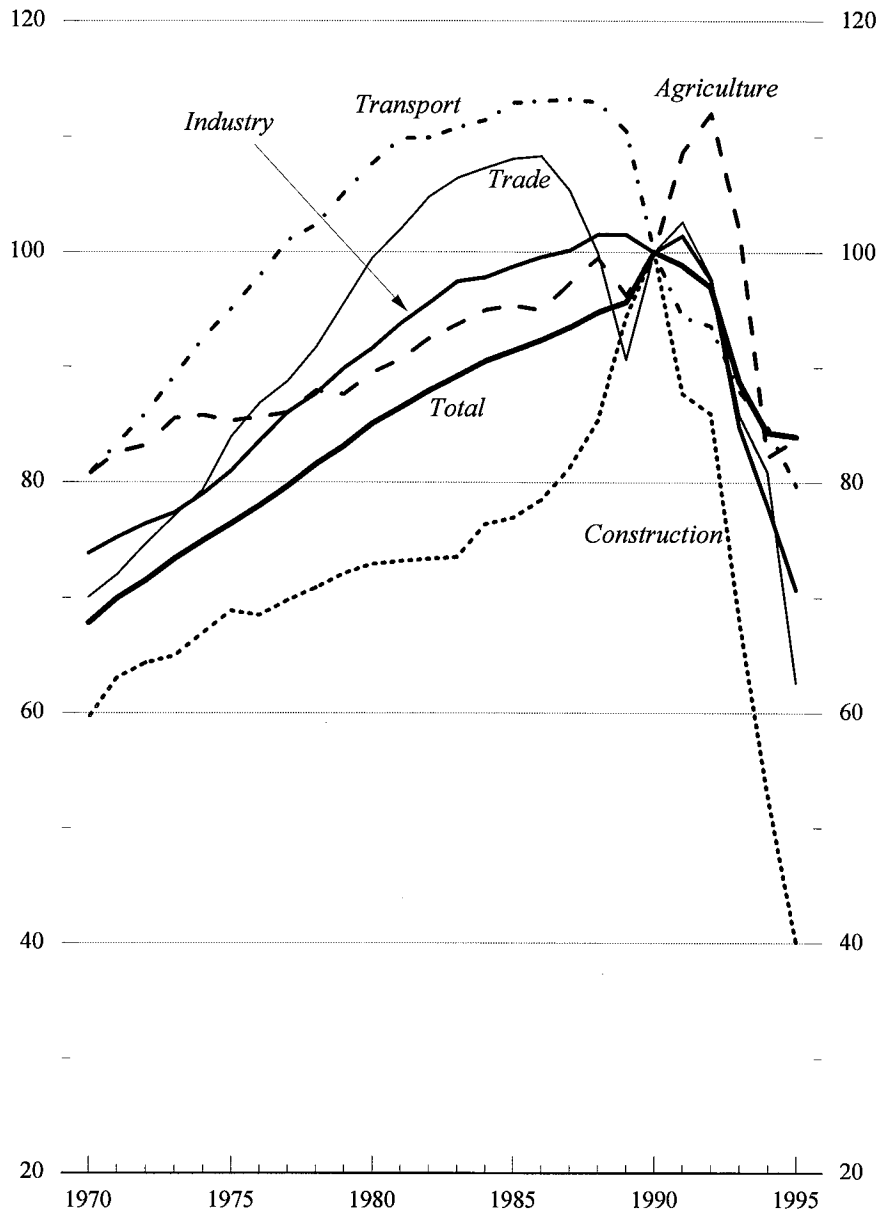
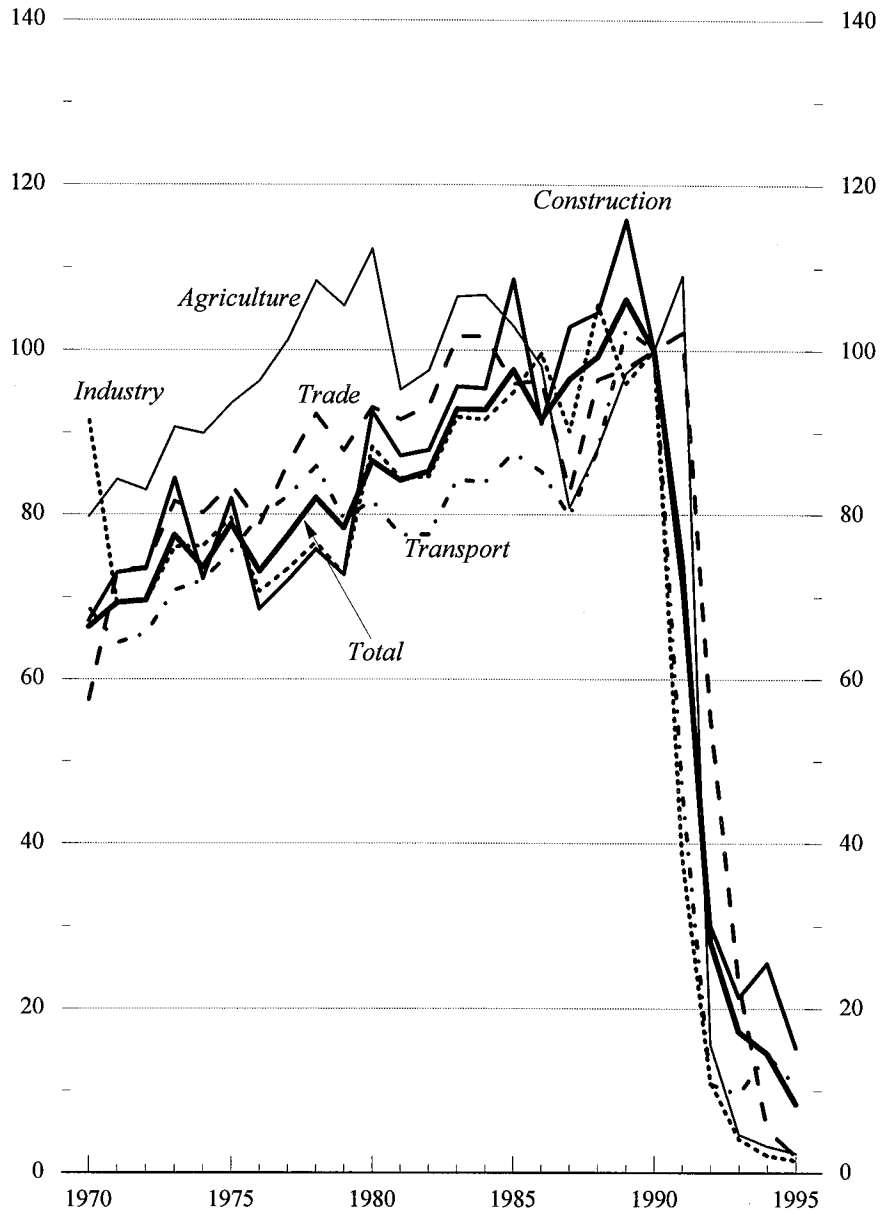


Figure 4. Kazakhstan: Investment
(1990 = 100)



where θ_i denotes the average income share of factor i ($i = K, L$) in total factor payments ($\theta_K + \theta_L = 1$). The index of TFP growth is a measure of the amount by which (the log) of output would have increased had all inputs remained constant between periods t and $t-1$.

Computations of TFP were made for the total so-called material production sphere and also for its five broad sectors, namely industry, agriculture, construction, transport and communications, and trade and procurement. Data on output, investment, employment, and income shares originate from the KNSA. Although the official data are internally consistent, they need to be adjusted. Data on output and investment are reported in “comparable prices”, a price concept that does not fully adjust for inflation. Moreover, pre-transition data on income shares are broad approximations, as factor payments were not market determined under the Soviet system; the results are, however, not very sensitive to the values of the income shares used. The data appendix describes in detail the adjustments made to take account of inflation and also other adjustments to obtain consistent series.

All broad sectors show somewhat similar patterns regarding growth rates of factors inputs, TFP and the resulting changes in output during three distinct periods, 1971-1980, 1981-1990, and 1991-1995 (see Table 2 and Appendix Tables 4 to 8). In the seventies--with the exception of the construction sector--rapid growth of the capital stock (at about 12 percent a year for the whole economy) and growth in employment (2 percent a year) accounted for output growth of about 5 percent a year; TFP growth was constant or declining in all sectors other than construction. In the eighties, further, but more moderate, increases in the capital stock and some increases in employment failed to prevent declines in output in industry and transport, as TFP fell, but helped to increase output for the other sectors, where TFP remained constant or increased. Finally, for the transition period from 1991 to 1995, the substantial output decline appears to reflect not only a decline in inputs of capital and labor, as aggregate employment declined by more than 16 percent and aggregate investment in real terms plummeted to less than 10 percent of its 1990 level, but also dramatic decreases in TFP.

The growth accounting computations illustrate the emphasis on capital accumulation under Soviet central planning. Major investment efforts in the seventies and eighties led to increases in the capital to output ratio for all sectors. Investment efforts focused on the industry, transport, and agricultural sectors; investment in the construction and trade and catering sectors were lower. With very low depreciation rates in the agricultural and industrial sectors (6 and 2 percent on average for 1971 to 1990, respectively), the capital-output ratios almost doubled. Declining TFP and rising capital-output ratios in the last two decades of the Soviet economic system are indicative of the system's deteriorating performance that resulted in its eventual breakdown, and suggest that both the aggregate capital stock and the level of output were inefficiently high at the outset of the transition.

The finding of a sharp drop in TFP during the transition is corroborated by computations according to the dual (price-based) approach to growth accounting, as in Shapiro (1987), and by simple calculations of labor productivity. The dual approach to growth

**Table 2. Kazakhstan: Computations of Total Factor Productivity
for the Whole Economy, 1970 to 1995**

(In percent)

| | NMP growth | TFP growth | Labor growth | Capital growth | Inv./ NMP | Cap./ NMP |
|------------------------------|---------------|---------------|-----------------|-------------------|--------------|--------------|
| 1970 | ... | ... | ... | ... | 0.49 | 2.24 |
| 1971 | 0.10 | 0.02 | 0.03 | 0.19 | 0.47 | 2.41 |
| 1972 | 0.08 | 0.01 | 0.02 | 0.17 | 0.43 | 2.60 |
| 1973 | 0.07 | 0.01 | 0.03 | 0.14 | 0.45 | 2.76 |
| 1974 | -0.01 | -0.07 | 0.02 | 0.14 | 0.43 | 3.18 |
| 1975 | -0.01 | -0.06 | 0.02 | 0.12 | 0.47 | 3.60 |
| 1976 | 0.10 | 0.05 | 0.02 | 0.11 | 0.39 | 3.63 |
| 1977 | -0.04 | -0.08 | 0.02 | 0.09 | 0.43 | 4.09 |
| 1978 | 0.12 | 0.07 | 0.02 | 0.08 | 0.41 | 3.97 |
| 1979 | -0.01 | -0.05 | 0.02 | 0.08 | 0.40 | 4.32 |
| 1980 | 0.05 | 0.02 | 0.02 | 0.07 | 0.41 | 4.39 |
| 1981 | 0.00 | -0.03 | 0.02 | 0.07 | 0.40 | 4.69 |
| 1982 | -0.02 | -0.05 | 0.02 | 0.06 | 0.41 | 5.06 |
| 1983 | 0.05 | 0.02 | 0.01 | 0.06 | 0.43 | 5.11 |
| 1984 | -0.01 | -0.04 | 0.01 | 0.06 | 0.44 | 5.51 |
| 1985 | 0.00 | -0.03 | 0.01 | 0.06 | 0.46 | 5.84 |
| 1986 | 0.03 | 0.01 | 0.01 | 0.06 | 0.42 | 5.98 |
| 1987 | 0.01 | -0.01 | 0.01 | 0.03 | 0.43 | 6.10 |
| 1988 | 0.02 | 0.00 | 0.01 | 0.05 | 0.44 | 6.25 |
| 1989 | -0.02 | -0.04 | 0.01 | 0.05 | 0.48 | 6.66 |
| 1990 | -0.01 | -0.05 | 0.05 | 0.05 | 0.45 | 7.04 |
| 1991 | -0.08 | -0.09 | -0.01 | 0.04 | 0.37 | 7.98 |
| 1992 | -0.04 | -0.03 | -0.02 | 0.02 | 0.14 | 8.46 |
| 1993 | -0.10 | -0.04 | -0.09 | -0.01 | 0.10 | 9.30 |
| 1994 | -0.18 | -0.16 | -0.05 | -0.01 | 0.10 | 11.19 |
| 1995 | -0.09 | -0.09 | 0.00 | -0.01 | 0.06 | 12.10 |
| <i>Memorandum items:</i> | | | | | | |
| average 1971-1994 | 0.00 | -0.03 | 0.01 | 0.07 | 0.38 | 5.69 |
| average 1971-1980 | 0.05 | -0.01 | 0.02 | 0.12 | 0.43 | 3.49 |
| average 1981-1990 | 0.01 | -0.02 | 0.02 | 0.05 | 0.44 | 5.82 |
| average 1991-1995 | -0.10 | -0.08 | -0.03 | 0.01 | 0.15 | 9.81 |
| share of labor for 1971-1995 | 0.67 | | | | | |

accounting derives the rate of change of TFP as a weighted average of the rates of change of the real wage and the real rental price of capital. Sharp decreases in real wages can therefore be seen as additional evidence of the drop in TFP. Finally, changes in the ratio of output to employment can be interpreted as a summary indicator of productivity developments, under the assumption of a constant capital endowment per worker. The calculations show a substantial decline in labor productivity during 1991-95 (see Figure 5, and Tables 3 and 4).

While the computations show how both declines in inputs of capital and labor and a sharp fall in TFP contributed to the output decline during the transition, they have to be interpreted with caution. The growth accounting framework is derived assuming that both the rate of depreciation and the rate of capacity utilization were the same throughout the 1970-95 period. The decline in TFP in the transition years also captures a likely decline in the rate of capacity utilization, and an increase in the economic rate of depreciation, reflecting the fraction of the capital stock made redundant by the move to a market economy.¹¹ The fall in TFP can therefore be interpreted as a summary measure of the combined impact of a number of elements that affected output during the transition, to be discussed in the next section.

V. WHY DID OUTPUT DECLINE SO MUCH?

Growth accounting provides a decomposition of the output decline into reductions in inputs of capital and labor and a fall in residual productivity, and suggests that some downward correction in investment and output was to be expected at the outset of the transition. Growth accounting, however, does not fully explain why output declined much more sharply than inputs of factors. Other hypotheses must be explored to explain this sharp fall in residual productivity. The role of disorganization, sectoral misallocation, credit contraction, and reductions in aggregate demand are analyzed in turn. These hypotheses, rather than being exclusive, complement each other in explaining why output did decline so much.

A. DISORGANIZATION

With the breakdown of central planning, traditional economic coordination mechanisms began to disintegrate. The resulting disorganization of existing production and trading links may have been an important determinant of the output fall, as argued in Blanchard and Kremer (1997). Government control of the economy did not disappear overnight following the breakdown of central planning, and continuing government interference may have added to the disorganization. Moreover, the dissolution of the Soviet

¹¹For the same reason, the sharp increases in capital-output ratios during the transition period have to be interpreted carefully: they reflect the sluggishness of the capital stock in the face of sharply declining output.

Figure 5. Kazakhstan: Real Wages
(March 1991 = 100)

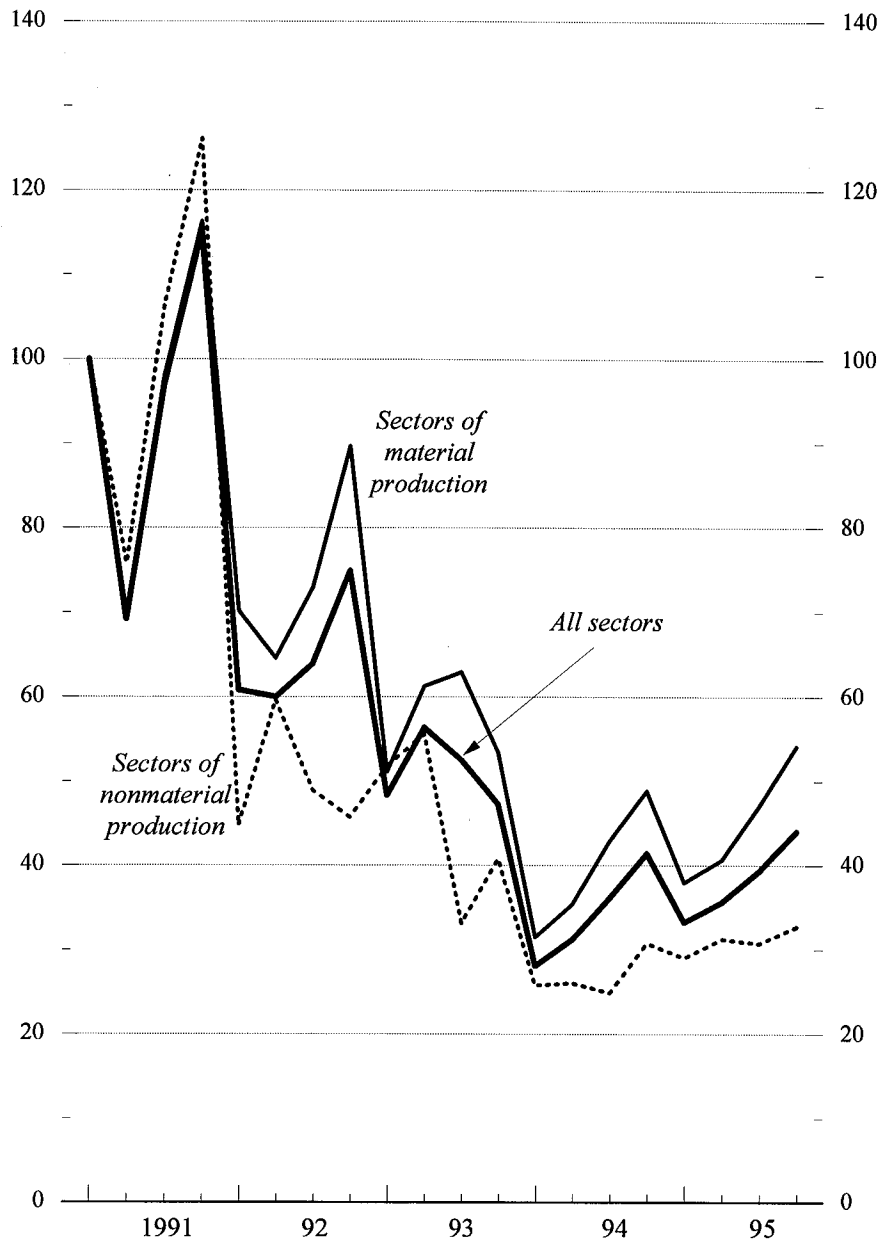


Table 3. Kazakhstan: Production and Productivity by Sector
(1990=100)

| | 1991 | 1992 | 1993 | 1994 | 1995 |
|------------------------------|-------------|-------------|-------------|-------------|-------------|
| Output | | | | | |
| Total | 91.8 | 88.5 | 80.0 | 65.6 | 59.8 |
| Industry | 100.4 | 83.3 | 71.6 | 51.9 | 47.8 |
| Agriculture | 77.3 | 99.6 | 92.7 | 73.0 | 57.5 |
| Construction | 98.0 | 56.1 | 45.6 | 37.3 | 29.6 |
| Transport and communications | 94.3 | 76.7 | 65.7 | 48.7 | 42.0 |
| Trade and procurement | 98.5 | 84.5 | 75.4 | 61.7 | 60.6 |
| Employment | | | | | |
| Total | 98.9 | 97.0 | 88.7 | 84.3 | 83.9 |
| Industry | 101.4 | 97.6 | 84.8 | 78.1 | 70.7 |
| Agriculture | 108.7 | 112.0 | 101.9 | 82.2 | 83.7 |
| Construction | 87.7 | 85.9 | 68.2 | 53.1 | 40.1 |
| Transport and communications | 94.4 | 93.6 | 87.9 | 84.9 | 79.7 |
| Trade and procurement | 102.7 | 97.9 | 85.9 | 80.9 | 62.6 |
| Productivity | | | | | |
| Total | 92.8 | 91.2 | 90.2 | 77.8 | 71.3 |
| Industry | 99.0 | 85.2 | 84.4 | 66.5 | 67.6 |
| Agriculture | 71.1 | 88.9 | 91.0 | 88.8 | 68.7 |
| Construction | 111.7 | 65.3 | 66.9 | 70.2 | 73.8 |
| Transport and communications | 99.9 | 81.9 | 74.7 | 57.4 | 52.7 |
| Trade and procurement | 95.9 | 86.3 | 87.8 | 76.3 | 96.8 |
| Real wages | | | | | |
| Total | 90.2 | 58.6 | 46.9 | 30.0 | 30.5 |
| Industry | 102.3 | 73.2 | 58.3 | 44.8 | 45.2 |
| Agriculture | 77.1 | 54.0 | 37.8 | 17.3 | 14.4 |
| Construction | 92.4 | 63.1 | 52.6 | 38.2 | 39.5 |
| Transport and communications | 90.6 | 65.8 | 58.0 | 37.5 | 38.9 |
| Trade and procurement | 95.3 | 56.2 | 50.7 | 31.0 | 30.8 |

Table 4. Kazakhstan: Production and Productivity by Sector in Industry
(1990=100)

| | 1991 | 1992 | 1993 | 1994 | 1995 |
|-----------------------------------|-------|-------|-------|-------|-------|
| Output | | | | | |
| All industry | 99.1 | 85.4 | 72.8 | 52.3 | 48.0 |
| Heavy industry | 98.8 | 88.0 | 74.2 | 58.3 | 55.2 |
| Electricity | 99.1 | 93.0 | 88.9 | 75.4 | 74.2 |
| Fuels | 102.5 | 96.5 | 82.2 | 70.7 | 62.0 |
| Ferrous metallurgy | 106.2 | 96.0 | 72.6 | 51.2 | 57.2 |
| Nonferrous metallurgy | 94.3 | 90.1 | 83.0 | 64.1 | 66.5 |
| Chemicals and petrochemicals | 94.9 | 69.4 | 38.4 | 22.6 | 23.5 |
| Machine building and metalworking | 102.4 | 85.7 | 73.1 | 46.0 | 33.2 |
| Forestry, woodworking, paper | 102.7 | 87.9 | 80.3 | 44.2 | 26.2 |
| Construction materials | 101.3 | 84.2 | 61.6 | 26.4 | 18.0 |
| Light industry | 102.5 | 81.0 | 71.5 | 39.8 | 16.4 |
| Food industry | 93.3 | 67.6 | 58.4 | 43.1 | 34.2 |
| Employment | | | | | |
| All industry | 98.1 | 96.3 | 91.4 | 93.0 | 91.1 |
| Heavy industry | 100.0 | 101.6 | 91.4 | 90.0 | 92.8 |
| Electricity | 110.7 | 114.1 | 102.0 | 107.2 | 103.2 |
| Fuels | 102.2 | 106.8 | 97.9 | 97.6 | 92.8 |
| Ferrous metallurgy | 97.5 | 103.7 | 99.9 | 100.0 | 102.6 |
| Nonferrous metallurgy | 98.4 | 111.5 | 100.6 | 98.9 | 99.5 |
| Chemicals and petrochemicals | 125.2 | 98.5 | 92.0 | 84.0 | 83.9 |
| Machine building and metalworking | 95.3 | 97.3 | 81.5 | 86.1 | 86.5 |
| Forestry, woodworking, paper | 97.3 | 95.7 | 89.1 | 73.5 | 90.6 |
| Construction materials | 94.2 | 97.3 | 92.8 | 74.6 | 90.6 |
| Light industry | 94.5 | 69.9 | 84.6 | 99.9 | 82.1 |
| Food industry | 91.7 | 99.4 | 98.5 | 106.9 | 89.5 |

Table 4. Kazakhstan (concluded)

| | 1991 | 1992 | 1993 | 1994 | 1995 |
|-----------------------------------|-------|-------|------|------|------|
| Productivity | | | | | |
| All industry | 101.0 | 88.7 | 79.6 | 56.2 | 52.7 |
| Heavy industry | 98.8 | 86.6 | 81.2 | 64.7 | 59.5 |
| Power and fuels | 96.0 | 86.7 | 84.6 | 70.8 | 68.3 |
| Electricity | 89.5 | 81.5 | 87.1 | 70.3 | 71.9 |
| Fuels | 100.3 | 90.3 | 84.0 | 72.4 | 66.8 |
| Metallurgy | 100.5 | 84.9 | 77.2 | 61.9 | 68.4 |
| Ferrous metallurgy | 108.9 | 92.5 | 72.7 | 51.2 | 55.8 |
| Nonferrous metallurgy | 95.8 | 80.7 | 82.5 | 64.8 | 66.9 |
| Chemicals and petrochemicals | 75.8 | 70.5 | 41.8 | 26.9 | 28.0 |
| Machine building and metalworking | 107.4 | 88.1 | 89.7 | 53.4 | 38.4 |
| Forestry, woodworking, paper | 105.5 | 91.9 | 90.1 | 60.2 | 28.9 |
| Construction materials | 107.5 | 86.6 | 66.4 | 35.4 | 19.9 |
| Light industry | 108.5 | 115.9 | 84.6 | 39.9 | 20.0 |
| Food industry | 101.7 | 68.0 | 59.3 | 40.3 | 38.2 |
| Real wages | | | | | |
| All industry | 102.3 | 73.2 | 58.3 | 44.8 | 45.2 |
| Heavy industry | 95.6 | 68.6 | 51.7 | 44.1 | 44.0 |
| Power and fuels | 108.4 | 86.7 | 69.5 | 61.3 | 53.3 |
| Electricity | 124.6 | 89.6 | 80.4 | 73.0 | 66.7 |
| Fuels | 96.6 | 84.4 | 60.7 | 50.9 | 40.1 |
| Metallurgy | 100.3 | 95.7 | 60.4 | 51.7 | 56.5 |
| Ferrous metallurgy | 97.6 | 87.5 | 58.4 | 53.2 | 62.8 |
| Nonferrous metallurgy | 102.1 | 100.8 | 61.7 | 50.8 | 52.5 |
| Chemicals and petrochemicals | 101.8 | 66.2 | 41.9 | 40.4 | 39.6 |
| Machine building and metalworking | 87.9 | 50.4 | 40.4 | 30.7 | 30.6 |
| Forestry, woodworking, paper | 88.4 | 50.0 | 39.3 | 25.5 | 25.4 |
| Construction materials | 90.4 | 57.9 | 46.4 | 35.0 | 36.7 |
| Light industry | 96.6 | 52.3 | 48.1 | 29.1 | 28.0 |
| Food industry | 101.8 | 64.9 | 54.8 | 35.9 | 33.3 |

Union created additional trade policy, payments, and financing problems, as discussed in Michalopoulos (1996). As Mundell (1997) emphasizes, a disruption of trade can have a multiplier effect on output. If imports are necessary to maintain production, a forced reduction in imports will create bottlenecks that reduce production capacity. Commodity deliveries that used to be domestic became cross-border transactions, and were disrupted by a range of trade restrictions, including state trading monopolies, licenses and quotas. Interstate payments, which initially took place through a system of centralized correspondent accounts, were delayed or never carried out at all. Finally, imbalances in interrepublican trade suddenly were transformed into current account deficits that gave rise to substantial external financing requirements. The section first offers an overview of the gradual reduction of the role of the state in the Kazakh economy, and then discusses how disorganization has affected output.

The evolving role of the state in economic activity and trade

During the Soviet era, central authorities used the Union-wide state orders system to control production levels and product flows for the bulk of output. Central planners' efforts to fully integrate Kazakhstan into the Soviet system resulted in a high degree of economic specialization--in raw materials production, heavy industry, and agriculture in particular--and a strong dependency on interrepublican supplies of raw materials and technical inputs. As Belkindas and Sagers (1990), Watson (1994), and Dikhanov (1995) show, in 1990 interrepublican imports were over 75 percent of total imports while over 90 percent of exports remained within the Union. Kazakhstan imported from other republics more than 25 percent of its domestic consumption of key commodities such as oil and gas, ferrous metals, chemicals, machinery and food products, and was dependent upon other republics for exports of more than 25 percent of its production in the nonferrous metals, chemical and light industry sectors. The Soviet production pattern and transport infrastructure made Kazakhstan heavily dependent on Russia for its oil trade and consumption in particular. The absence of an east-west domestic pipeline left Russia as the only outlet for crude oil extracted in western Kazakhstan, while Russia was the only source of crude oil for the Kazakh eastern refineries, which supplied most domestic consumption. At the same time, the Soviet economic system allowed Kazakhstan to benefit from a net resource transfer in its trade with the other republics. The size of the transfer in the final years before the break-up of the Soviet Union has been estimated at around 10 percent of output.¹² The transfer was covered by net financial allocations from the central budget and by implicit subsidies via the pricing mechanism, as interrepublican trade was conducted at administered prices.

¹²The size of the transfer has been estimated by revaluing actual commodity flows at world market prices, as in, for instance, Brown and Belkindas (1993), Tarr (1994), and Vavilov and Vjugin (1993). This research also shows that the overall effect from changing the valuation of commodity flows to world prices has been limited, suggesting that budgetary allocations rather than price subsidies were the main counterpart of the resource transfer. Budget data confirm that Kazakhstan was a net financial recipient in the union budget, mainly on account of its relatively high share in centrally allocated investment funds.

The government of newly independent Kazakhstan initially tried to maintain the Soviet inherited production and trade patterns. It established its own state order system covering around three quarters of 1992 output--mineral fuels, base metals and agricultural products in particular--and concluded bilateral trade agreements with other newly independent countries for interstate deliveries. Production and trade under bilateral arrangements were financed through directed credits and correspondent account credits at the Central Bank of Russia in the context of the ruble zone. Delivery targets were not met, however, because of organizational problems and a weakening of enterprises' incentives to comply with the system. Efforts to target production and secure supply links continued in 1993, as the government redesigned the state order system and negotiated new bilateral trade agreements with other CIS countries. A "state needs" system was introduced, covering about 20 percent of output, mainly in agriculture. The system was intended to be less compulsory in nature than state orders: transactions were meant to take place at negotiated prices and deliveries to be conditional on receiving payment. Compliance with the new state needs system was low, and deliveries under the bilateral trade agreements were further affected by the reduction in interstate financing and the dissolution of the ruble area. As a result, interstate trade fell sharply in 1993.

Government intervention in production and supply was substantially reduced in 1994-95, and the remaining elements of the former command system were mostly eliminated. In the industrial sector, the state needs system was discontinued in 1994, and a new initiative to maintain government control over production--the creation of a network of state holding companies to cover large enterprises in which the state continued to have a stake--was eventually abandoned. In agriculture, the state needs system was downsized in 1994 and reformed, and further reduced to the procurement of grain only the following year. At the same time, the mass privatization program for medium-size industrial enterprises was initiated and agricultural privatization accelerated; measures to further reduce the scope of price controls were taken; and directed credits were abolished. State trading activity continued to be substantial, however, and new bilateral agreements, although reduced in scale, were concluded to cover trade in a number of key commodities. Following a further large drop in 1994, interrepublican commodity flows finally stabilized in 1995.

The effects of disorganization

The clearest indicator of disruptions in central planning based links is the sharp fall in interstate deliveries for a large range of products, as illustrated in Appendix Table 9. Government interference in interstate trade, including bilateral delivery agreements at prices substantially below world market levels and quantitative restrictions on exports by enterprises other than state trading companies, aggravated the effects of the elimination of coordination through Moscow. Oil trade between Russia and Kazakhstan was particularly affected, and energy balance data show a fall in the ratio of total output to available oil products during the transition, indicating that unavailability of such products may have acted as a constraint on production (see Appendix Table 10). While interstate trade was in disarray, extra-republican trade, which was subject to less direct state intervention, grew rapidly. Evaluated at world

market prices, the share of extra-republican in total exports rose from around 11 percent in 1990 to around 47 percent in 1995, mainly on account of shifts in export destination for oil and base metal products.¹³

In addition to trade data, other more indirect evidence on disruptions in traditional input and output channels is available. According to enterprise surveys, difficulties in obtaining raw materials and intermediate inputs were the most severe among the impediments to production.¹⁴ Monthly production data for a large number of industrial commodities reveal sharp swings in output, including sudden production standstills followed by periods of relative recovery. The monthly output swings started to level off from late 1994 on, marking the return to more stable input and output patterns. An index of the dispersion of the monthly changes in output for 36 industrial commodities indicates an increase in dispersion in 1993-94, and the leveling-off afterwards (see Figure 6).¹⁵

On the basis of the available evidence, the role of disorganization in explaining the output decline can be interpreted as follows. First, steep declines in interstate deliveries and sharp short-term movements in production support the view that traditional input and output channels were disrupted during the transition. Second, government interference to maintain elements of the command system in the early years of the transformation, interference in interrepublican trade in particular, delayed the establishment of market based coordination mechanisms and further contributed to the output decline. Moreover, it has to be kept in mind that disorganization does not account for longer lasting shifts in output and trade patterns that result from deliberate choices not to reestablish old links in the face of changing relative prices and profit opportunities (Kornai, 1994); this issue is taken up in the next section.

¹³The share of extra-republican in total imports equally rose; however, due to unrecorded shuttle trade, accurate data are unavailable.

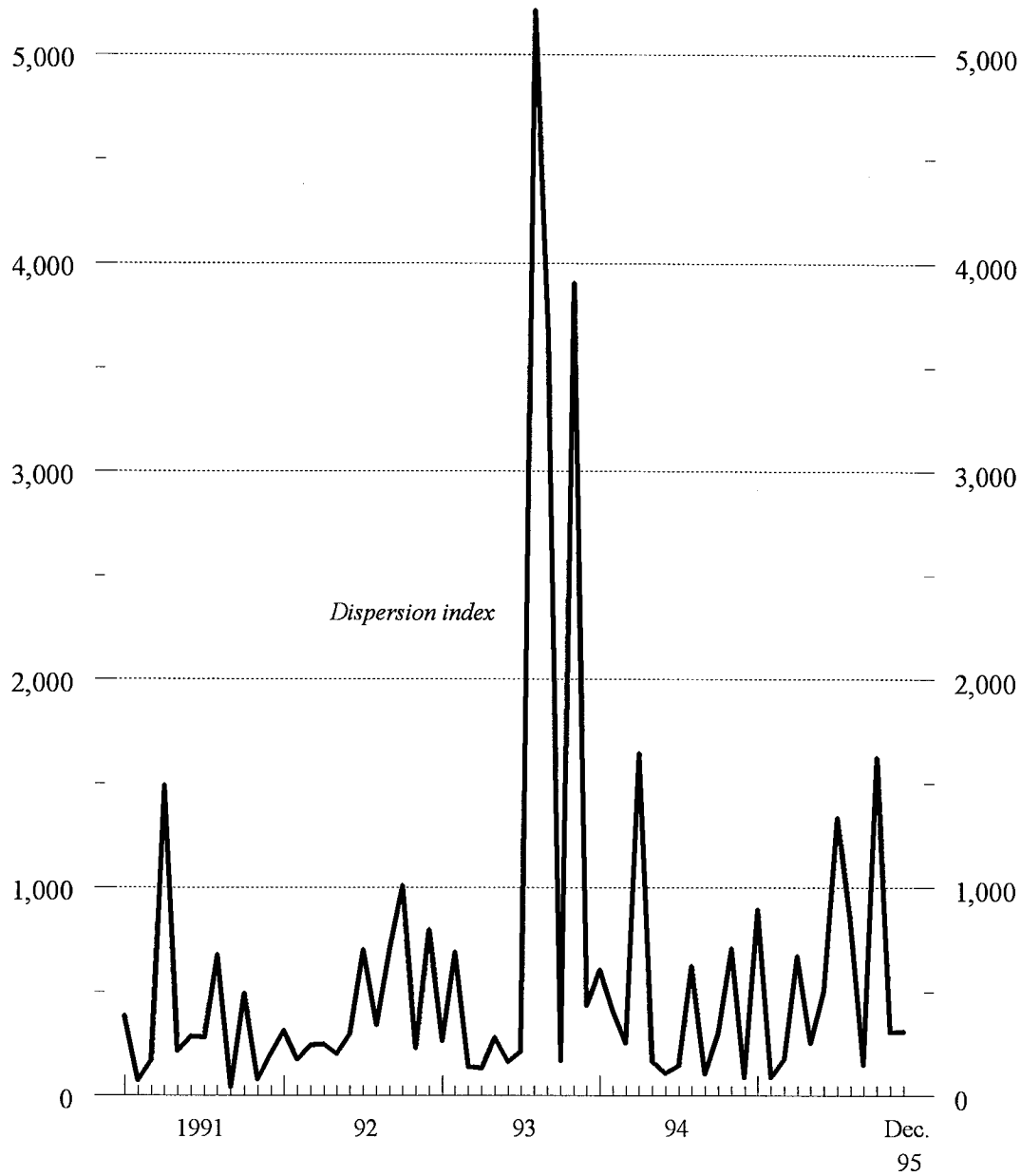
¹⁴In a 1993 sample survey of Kazakh enterprises by the International Development Center of Japan (Mitsui, 1994), enterprises were asked which factors most negatively affected their production; difficulties in getting intermediate inputs were ranked first. Similarly, an end-1994 KNSA survey on the causes of shut-downs of enterprises and individual production enterprises found that 47 percent of the total loss of working time was reported to have resulted from shortages of intermediate inputs and power outages.

¹⁵The index of dispersion is constructed as:

$$\sigma_t^2 = \sum_{i=1}^N \left\{ \frac{Y_{it}}{Y_t} \right\} \{ \Delta Y_{it} - \Delta Y_t \}^2$$

where Y_{it} is output in sector i at time t , Y_t is aggregate output at time t , and the operator Δ represents the growth rate of a variable.

Figure 6. Kazakhstan: Dispersion of Output Changes in Industry¹



¹ The index of dispersion is constructed as:

$$\sigma_t^2 = \sum_{i=1}^N \left\{ \frac{Y_{it}}{Y_t} \right\} \{ \Delta Y_{it} - \Delta Y_t \}^2$$

where Y_{it} is output in sector i at time t , Y_t is aggregate output at time t , and the operator Δ represents the growth rate of a variable.

B. SECTORAL MISALLOCATION

In the absence of an allocation mechanism based on market prices, the sectoral allocation of factors of production and output was heavily distorted under central planning. Large changes in relative prices induced by the combined price liberalization and opening to world markets significantly affected sectoral prospects, and created incentives to withdraw or reallocate factor inputs across sectors. Factor reallocation can have negative aggregate implications if sectors that are adversely affected are larger or more factor intensive than sectors that see their relative price position improve, or if it takes time, effort, and expense to reallocate (Zettelmeyer, 1993). Workers may be temporarily unemployed while searching for appropriate new jobs (Lilien (1982), Allison and Ringold, (1996), Davis et al. (1996)), and new capital takes time to build.¹⁶ This section examines in more detail: the distortions in relative prices; the extent and direction of sectoral factor reallocation; and the presence of frictions in the reallocation process.

Distortions in relative prices

Deviations in the structure of relative prices under Soviet central planning from world market prices offer an indication of the pattern of sectoral misallocation at the outset of the transition. An official Soviet dataset assigning world market prices to products shipped in interrepublic trade between Kazakhstan and the other republics, as published in Tarr (1993), indicates that prices in the power, oil and gas and nonferrous metallurgy sectors were significantly below world market levels, while products of the timber and paper, light and food industries were overpriced. KNSA data on the evolution of Kazakh producer prices from 1991 onwards, show a gradual convergence toward a more market determined structure, as, following the elimination of price controls, prices in the initially undervalued sectors rose relative to those in overvalued ones. At a more aggregate level, prices in the agricultural and construction sectors have fallen relative to prices in the other major sectors in the early years of the transition.

Extent and direction of sectoral reallocation of factors

The changes in sectoral relative prices induced a sectoral reallocation of factors. Labor and investment have broadly moved toward sectors where prices increased during the transition and away from the losing sectors. A reorientation of labor and capital inputs toward the electricity, fuel and metallurgy sectors in industry and away from light industry offers the clearest evidence of such a move; labor hoarding in agriculture is the main exception. More specifically, the share in total employment of all non-services sectors other than agriculture declined significantly, with a sharp drop of the construction sector's share in particular (see

¹⁶Transition related frictions could add to the time, effort, and expense that are needed to reallocate labor, as in Boeri (1997), and capital, as in Roland and Verdier (1997).

Table 5).¹⁷ Within industry, labor was reallocated from the machine building, construction materials and light industry sectors to the electricity, fuel, and metallurgy sectors (see Table 6). Data on sectoral investment expenditures provide further evidence on the reallocation of production factors. Between 1990 and 1995, the share of investment in agriculture and construction fell dramatically, while transportation and especially industry gained in importance (Appendix Table 12). Within industry, an increasing share of new investment was directed toward the oil and metallurgical sectors, while the relative importance of investment in the chemical, machine building, construction materials and light industry sectors sharply declined (Appendix Table 13). With new investment having dropped to only a small fraction of pre-transition levels, the effect of sectoral changes in investment patterns on the overall allocation of the capital stock has been rather limited, however.

The reallocation of capital and labor toward sectors that were underpriced under central planning and away from sectors where prices had been artificially high contributed to a relative increase in output in the former sectors. The combined relative price-relative output increase is reflected in changes in the sectoral composition of value added.¹⁸ Among the broad sectors of the economy, the service sector was the main gainer, while the relative decline was most pronounced in agriculture. Within industry, the electricity, fuel and ferrous metallurgy sectors benefitted from the transition, but the machine building, construction materials and light industry sectors were negatively affected.

The computation of productivity changes resulting from input movements supports the view that sectoral reallocation has been moving in the "right" direction. Productivity changes from input reallocation can be identified by disaggregating the growth accounting framework presented in section IV on a sectoral basis, as in Jorgenson, Gollop, and Fraumeni (1987) and in World Bank (1996a, Annex 4). Disaggregation makes it possible to decompose total factor productivity growth as derived in equation (1) into terms measuring the effects of sectoral reallocation of capital and labor and a residual, productivity growth.

¹⁷The corresponding increase in the overall employment share of services reflects both broadly stable employment in the state supported municipal, educational and health sectors and growing employment in new private sector activities.

¹⁸The link between relative price and output movements and changes in value added shares can be understood as follows. An increase in the share of a sector in total constant prices value added indicates a rise in relative output for that sector. Furthermore, an increase in the share in current prices value added which exceeds the increase in constant prices value added indicates a rise in the sector's relative price, at the same time as a rise in relative output. Other patterns of changes in value added shares can be interpreted analogously. To verify the changes in sectoral value added shares, also information on changes in sectoral wage bill shares was collected: the latter changes are broadly in line with the former.

Table 5. Kazakhstan: Sectoral Shares in Employment, Value Added, and Wages
(In percent)

| | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 |
|--|------|------|------|------|------|------|
| Employment shares | | | | | | |
| Agriculture | 22.1 | 24.3 | 25.5 | 25.4 | 21.6 | 22.0 |
| Industry | 19.7 | 20.2 | 19.8 | 18.8 | 18.3 | 16.6 |
| Construction | 11.6 | 10.3 | 10.3 | 8.9 | 7.3 | 5.6 |
| Transport and communication | 6.5 | 6.2 | 6.3 | 6.5 | 6.6 | 6.2 |
| Trade and procurement | 7.2 | 7.5 | 7.2 | 7.0 | 6.9 | 5.4 |
| Other | 32.8 | 31.4 | 30.8 | 33.4 | 39.4 | 44.2 |
| Value added shares in current prices | | | | | | |
| Agriculture | 34.8 | 28.8 | 24.5 | 17.1 | 15.2 | 12.9 |
| Industry | 21.0 | 26.6 | 32.7 | 29.8 | 29.7 | 24.7 |
| Construction | 12.1 | 10.2 | 8.2 | 11.1 | 11.1 | 6.5 |
| Transport and communication | 9.6 | 7.3 | 7.9 | 10.4 | 11.4 | 11.2 |
| Trade and procurement | 8.4 | 7.9 | 9.0 | 10.8 | 12.4 | 18.1 |
| Other | 14.2 | 19.1 | 17.9 | 20.9 | 20.2 | 26.6 |
| Value added shares in constant prices (base 1995) | | | | | | |
| Agriculture | 11.4 | 9.7 | 14.4 | 15.0 | 14.7 | 12.9 |
| Industry | 29.1 | 30.5 | 27.7 | 26.9 | 25.0 | 24.7 |
| Construction | 10.3 | 10.5 | 7.8 | 7.3 | 7.3 | 6.5 |
| Transport and communication | 14.8 | 14.6 | 13.1 | 12.7 | 12.0 | 11.2 |
| Trade and procurement | 18.0 | 18.5 | 17.2 | 17.2 | 17.3 | 18.1 |
| Other | 16.4 | 16.1 | 19.8 | 21.0 | 23.7 | 26.6 |
| Wage bill shares | | | | | | |
| Agriculture | 23.3 | 21.9 | 24.8 | 21.5 | 13.1 | 11.0 |
| Industry | 21.6 | 25.2 | 27.2 | 25.7 | 29.9 | 27.0 |
| Construction | 14.2 | 12.9 | 13.6 | 12.3 | 11.4 | 8.8 |
| Transport and communication | 7.1 | 6.8 | 7.7 | 8.7 | 11.3 | 10.7 |
| Trade and procurement | 5.7 | 6.2 | 5.5 | 5.9 | 10.5 | 12.6 |
| Other | 28.1 | 27.0 | 21.3 | 25.9 | 23.8 | 30.0 |

Table 6. Kazakhstan: Sectoral Shares in Employment, Gross Output, and Wages in Industry
(In percent)

| | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 |
|---|------|------|------|------|------|------|
| Employment shares | | | | | | |
| Electricity | 5.0 | 5.7 | 6.7 | 7.5 | 8.7 | 9.8 |
| Fuel | 7.5 | 7.8 | 8.7 | 9.3 | 9.8 | 9.9 |
| Ferrous metallurgy | 5.2 | 5.2 | 5.6 | 6.1 | 6.6 | 7.4 |
| Nonferrous metallurgy | 7.9 | 7.9 | 9.1 | 10.1 | 10.7 | 11.7 |
| Chemicals | 5.9 | 7.6 | 7.7 | 7.8 | 7.0 | 6.5 |
| Machine Building | 27.4 | 26.6 | 26.9 | 24.0 | 22.2 | 21.1 |
| Paper and woodworking | 4.0 | 4.0 | 3.9 | 3.8 | 3.0 | 3.0 |
| Construction Materials | 9.5 | 9.1 | 9.2 | 9.3 | 7.5 | 7.4 |
| Light Industry | 16.6 | 16.0 | 11.6 | 10.7 | 11.5 | 10.4 |
| Food | 10.9 | 10.2 | 10.5 | 11.4 | 13.1 | 12.8 |
| Gross output shares in current prices | | | | | | |
| Electricity | 5.6 | 5.2 | 9.9 | 15.5 | 20.0 | 17.8 |
| Fuel | 8.5 | 8.2 | 20.8 | 16.9 | 23.1 | 23.5 |
| Ferrous metallurgy | 5.9 | 6.2 | 11.9 | 11.4 | 12.6 | 15.1 |
| Nonferrous metallurgy | 11.9 | 9.8 | 17.6 | 14.5 | 12.7 | 12.8 |
| Chemicals | 7.1 | 6.8 | 8.1 | 4.3 | 4.0 | 4.1 |
| Machine Building | 17.3 | 12.5 | 9.1 | 10.7 | 7.7 | 7.9 |
| Paper and woodworking | 3.0 | 2.3 | 1.3 | 2.5 | 1.1 | 1.1 |
| Construction Materials | 6.2 | 5.3 | 4.2 | 5.6 | 4.3 | 4.1 |
| Light Industry | 16.9 | 19.9 | 6.8 | 6.2 | 4.0 | 2.8 |
| Food | 17.6 | 23.9 | 10.3 | 12.3 | 10.5 | 10.8 |
| Gross output shares in constant prices (base 1995) | | | | | | |
| Electricity | 10.4 | 10.3 | 11.3 | 12.9 | 15.3 | 17.8 |
| Fuel | 16.4 | 16.9 | 18.5 | 18.8 | 22.6 | 23.5 |
| Ferrous metallurgy | 10.8 | 11.5 | 12.2 | 11.0 | 10.8 | 15.1 |
| Nonferrous metallurgy | 8.5 | 8.0 | 8.9 | 9.8 | 10.6 | 12.8 |
| Chemicals | 7.6 | 7.2 | 6.1 | 4.1 | 3.3 | 4.1 |
| Machine Building | 11.1 | 11.4 | 11.1 | 11.3 | 10.0 | 7.9 |
| Paper and woodworking | 2.0 | 2.0 | 2.0 | 2.2 | 1.7 | 1.1 |
| Construction Materials | 9.8 | 9.9 | 9.6 | 8.4 | 5.0 | 4.1 |
| Light Industry | 7.8 | 8.0 | 7.4 | 7.8 | 6.0 | 2.8 |
| Food | 15.7 | 14.8 | 13.0 | 13.7 | 14.6 | 10.8 |
| Wage bill shares | | | | | | |
| Electricity | 5.4 | 7.8 | 9.1 | 11.9 | 15.2 | 15.8 |
| Fuel | 11.5 | 11.9 | 16.0 | 16.0 | 17.2 | 13.9 |
| Ferrous metallurgy | 6.4 | 6.4 | 8.6 | 8.1 | 9.7 | 13.0 |
| Nonferrous metallurgy | 9.0 | 9.5 | 15.0 | 13.1 | 14.1 | 16.0 |
| Chemicals | 6.2 | 8.3 | 7.7 | 6.3 | 6.7 | 6.1 |
| Machine Building | 26.9 | 23.7 | 19.0 | 17.6 | 15.2 | 14.4 |
| Paper and woodworking | 3.7 | 3.4 | 2.6 | 2.6 | 1.6 | 1.6 |
| Construction Materials | 9.3 | 8.3 | 7.4 | 7.8 | 5.8 | 6.1 |
| Light Industry | 12.5 | 12.0 | 6.5 | 7.2 | 5.7 | 5.0 |
| Food | 9.0 | 8.8 | 8.0 | 9.5 | 8.7 | 8.0 |

$$\begin{aligned} \ln[Y_t/Y_{t-1}] &= \theta_k \ln[K_t/K_{t-1}] + \theta_L \ln[L_t/L_{t-1}] \\ &+ \sum_i \theta_{Ki} y_{it} \ln[K_{it}/K_{it-1}] + \sum_i \theta_{Li} y_{it} \ln[L_{it}/L_{it-1}] , \quad (2) \\ &+ \sum_i y_{it} TFP_{it, t-1} \end{aligned}$$

where K_i denotes capital in sector i , L_i labor in sector i , and y_i the share of sector i in total value added. Within this modified growth accounting framework, factor reallocation is estimated to have raised aggregate output by around one percent a year from 1993 onwards.

Frictions in the reallocation process

An analysis of labor turnover suggests that there were no major impediments for labor to move across sectors during the transition. During 1992-93, each year around 24 percent of workers employed in state and former state enterprises and in the government sector moved to another job, while new hirings amounted to around 18 percent of the workforce, in line with, for the construction and industrial sectors, the pre-transition period (see Appendix Table 11).¹⁹ Worker turnover as a percent of average employment rose in 1994-95, suggesting an intensification of the labor reallocation process. On a sectoral basis, worker turnover was particularly high in the construction, and trade and procurement sectors. Other evidence equally indicates that sectoral employment shifts did not result in major search unemployment: the correlation between the dispersion across sectors in the rate of change of employment, which was fairly constant, and the aggregate unemployment rate, which steadily increased, is low.²⁰

Data on changes in the structure of relative prices and reallocation of production factors during transition are stark indicators of severe sectoral misallocation under central planning. Following price liberalization and opening to trade, sectors where output had been sustained by government before the transition had to scale back production levels and reduce factor use, while other sectors were in a position to expand. Available data do not indicate that, as such, frictions in the sectoral reallocation of production factors had significant negative output effects. Asymmetries in the size of the sectors that had to downsize and the sectors that could expand appear to have been a more likely source of aggregate output reductions. However, even allowing for these asymmetries, sectoral misallocation cannot explain the full extent of the output decline: all sectors, including the ones that were benefitting from changes in relative prices, have been affected.

¹⁹Construction and industry are the only sectors for which pre-transition worker turnover data are available.

²⁰These computations are based upon quarterly employment data for 16 sectors and estimates of quarterly total - officially registered and hidden - unemployment.

C. CREDIT CONTRACTION

Financial factors are often considered to have played a major role in the output contraction in the transition countries. Under central planning, firms were financed by a centralized official banking system, which allocated credit so as to mirror planned commodity flows; financial institutions providing intermediation, monitoring and screening services were nonexistent. With the move toward a market based economic system, enterprises could no longer rely upon centralized financing, and liquidity shortages and limited access to credit started to act as constraints on production (Calvo and Coricelli, 1993).²¹ A range of data on the evolution of monetary aggregates and interest rates, on enterprise profitability and arrears, and on bank credit to the economy can shed more light on the role of liquidity and credit constraints in explaining the output decline.

Monetary expansion and contraction

Inflationary pressures began to build up in the years before the breakup of the Soviet Union, as a deepening monetary disequilibrium developed during the second half of the 1980s. Bank financing of Union budget deficits contributed to a rapid growth in net domestic credit, while wage increases in the presence of price controls and rationing in the consumer goods market led to the accumulation of liquid assets by the household sector, a "monetary overhang." The ratio of year-end household monetary assets to household annual money income in Kazakhstan rose from around 50 percent in 1985 to more than 100 percent in 1991, largely on account of forced saving. A more than 200 percent increase in the consumer price index following large-scale price liberalization measures in January 1992, sharply reduced outstanding credit in real terms and eliminated the monetary overhang. During 1992 and until the middle of 1993, Kazakhstan tried to maintain key elements of the old financial system, while gradually shifting toward more expansionary policies. The country remained member of the ruble zone and put in place an elaborate system of directed credits to finance agriculture and industry. High inflation started to further erode real money balances and resulted in sharply negative real interest rates from 1992 onward (see Figures 7 and 8).²²

Following the introduction of a national currency in late 1993 and a sharp monetary expansion in the context of an interenterprise arrears clearing operation in early 1994, a tight monetary policy was adopted in the spring of 1994 and maintained subsequently. Interest rates became market determined, as the role of directed credits was gradually reduced in the course

²¹Calvo and Coricelli (1993) test this hypothesis for a sample of 85 branches of industry in Poland and conclude that at least 20 percent of the output decline is due to the credit contraction.

²²Real interest rates are computed as the ratio of (one plus) the central bank rate on a monthly basis, computed taking account of compounding, to (one plus) the rate of change of the consumer price index in the corresponding month (minus one).

Figure 7. Kazakhstan: Real Money and Credit Variables
(December 1991 = 100)

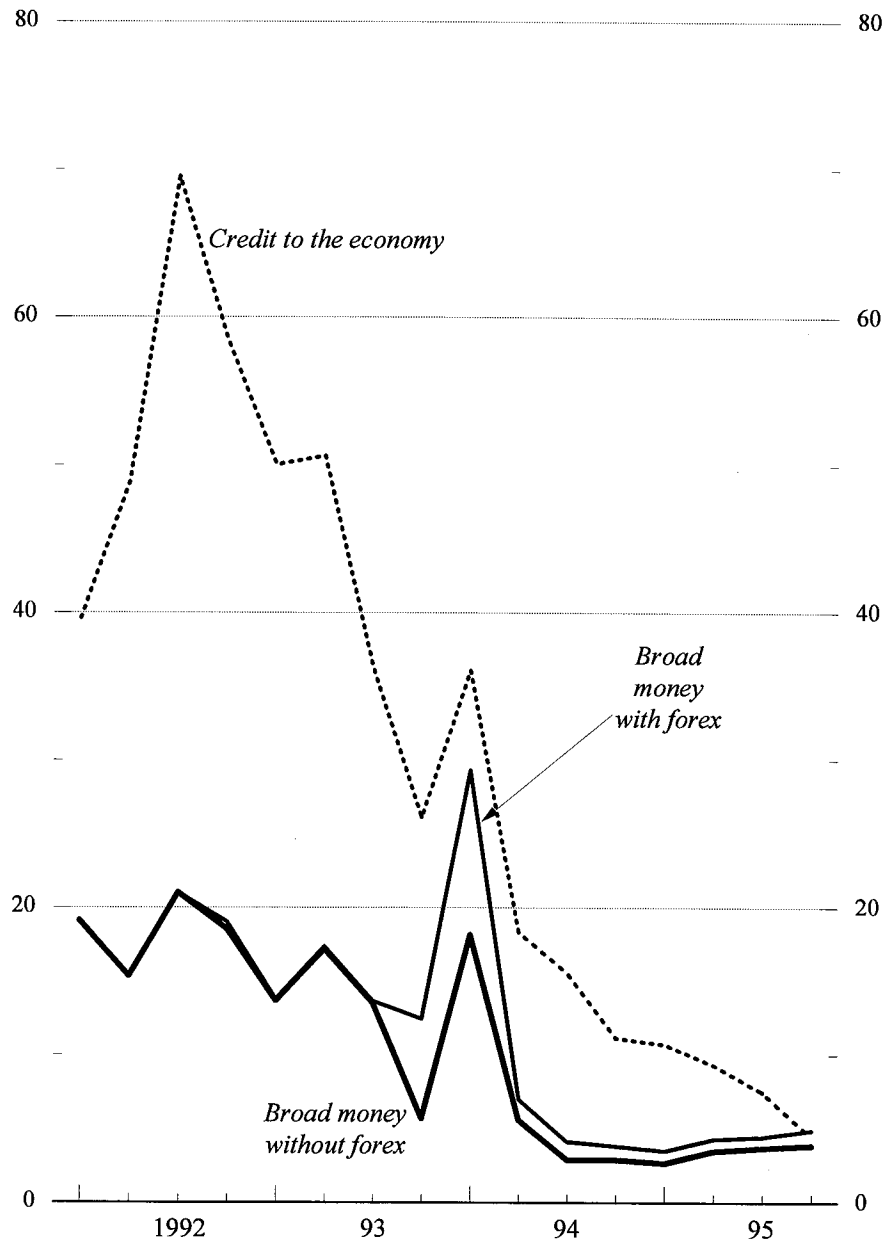
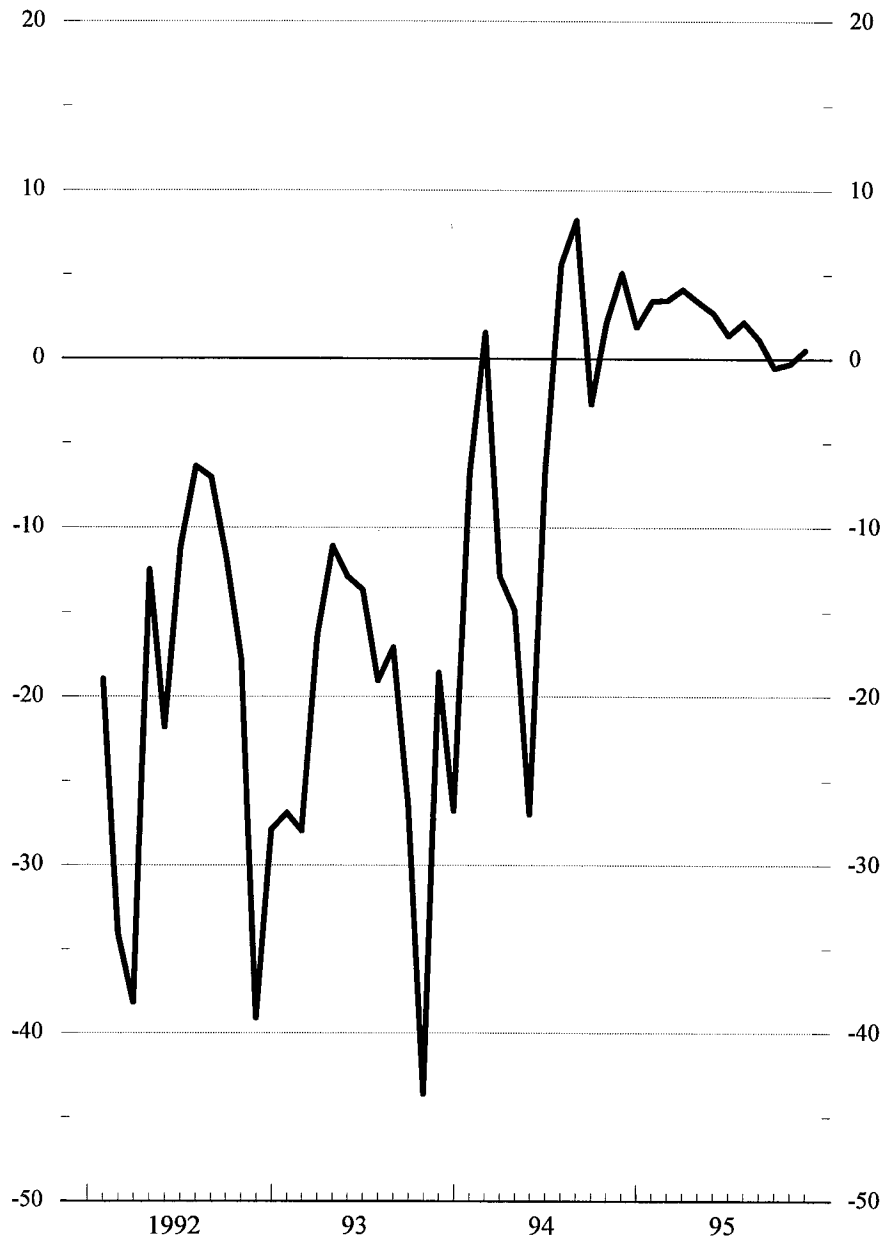


Figure 8. Kazakhstan: Real Interest Rate
(In percent)



of 1994 and new directed credits were completely eliminated in early 1995. Inflation subsided, real money balances stabilized and real interest rates turned positive from the middle of 1994.

The erosion of enterprise profitability

Data on profitability indicate a steady deterioration in the financial conditions of enterprises in the course of the transition. Profits in real terms sharply deteriorated from 1992 on, and a number of sectors, agriculture in particular, became loss-making. Real profits in construction and industry continued to fall throughout 1995, but there was a recovery in transport and communications (Appendix Table 14).

As financial positions weakened, enterprises started to accumulate substantial arrears. Interenterprise arrears were cleared twice, in the summer of 1992 and the spring of 1994, but each time resumed their growth in real terms soon afterwards. Interenterprise arrears amounted to around 25 percent of annualized GDP in the last quarter of 1995, and were more than four times higher than bank credit to enterprises at the end of the year.²³ Arrears to the banking system increased sharply in real terms during 1992-93 but then gradually declined in the aftermath of the 1994 arrears clearing operation, amounting to less than 2 percent of GDP or around one third of outstanding loans to enterprises at the end of 1995 (Appendix Table 15). In addition to interenterprise and bank loans arrears, enterprises started to accumulate wage arrears, to the tune of around 2.5 percent of GDP. Declining profitability and rising arrears are clear indications of increasing financial pressures on enterprises. Arrears, on the other hand, also have allowed enterprises to maintain production in the face of such pressures, thereby weakening the link between the financial environment and output.

Credit contraction

Data on banking system credit to the non-government sectors, finally, offer evidence of sharply curtailed access to credit. High inflation until the middle of 1994 and tight financial policies thereafter resulted in a steady decline of credit to the economy in real terms, interrupted only by the credit expansion during the early 1994 arrears clearing operation (see Appendix Table 16). Reflecting intensifying banking sector problems, credit to the economy recorded declines even in nominal terms in 1995; at the end of the year, outstanding bank loans to the non-government sectors amounted to less than 6 percent of annualized last-quarter GDP.²⁴ More disaggregated data show that credit to agriculture in particular has fallen

²³Calvo and Coricelli (1996) show in a theoretical model that interenterprise arrears do not simply reflect a situation in which winners make transfers to losers. They rather reflect to a large extent a vicious circle in which firms cannot comply with their contractual obligations, because other firms cannot comply with their contractual obligations, etc.

²⁴The evolution of credit during 1994-95 reflects the discontinuing of reporting by banks that
(continued...)

to very low levels and that available credit was almost entirely short-term. Limited access to credit is likely to have negatively affected both current activities and investment, to the extent it resulted from imperfections in the bank lending process rather than a response to deteriorating financial conditions in the enterprise sector.

Developments in profitability, arrears and real credit offer strong evidence of rising financial pressures and credit restrictions in the Kazakh economy. These developments appear to result mainly from underlying weaknesses in firms' financial performances and inadequate financial intermediation rather than from the monetary policy stance. With real money and credit beyond their control, as clearly illustrated by negative real money and credit growth under the highly expansionary monetary policy until early 1994, the monetary authorities were not in a position to alleviate financial constraints.²⁵ The output decline does not appear to have been reversed by the lax monetary policy and below market interest rates in the early years of the transition, or accelerated by the adoption of a tight monetary policy in the spring of 1994. While financial system imperfections are likely to have contributed to the output decline, their exact contribution is difficult to quantify, as the links between financial factors and output are diverse and involve such issues as the role of arrears and the contribution of bank loans to the financing of investment in productive capacity.

D. REDUCTIONS IN AGGREGATE DEMAND

Various studies of the output decline in transition countries also emphasize the separate role of reductions in one or more of the main components of aggregate demand. According to these studies, an autonomous shortfall in aggregate demand relative to the level that could be supported by the capital stock and the labor force has constrained output. The shortfall is in turn related to the impact of restrictive fiscal and monetary policies or, for net exports, to the effects of the post-Soviet trade shock. This section reviews developments in the main components of aggregate demand in Kazakhstan, government expenditures in particular.²⁶

²⁴(...continued)

were closed and the removal from the balance sheets of banks of sizeable amounts of nonperforming loans in foreign currency under government guarantees. Moreover, for the financing of current activities, arrears accumulation has served as an alternative to bank lending.

²⁵See Ghosh (1996) for a theoretical analysis of the endogeneity of real money and credit during the transition, and for evidence on Ukraine.

²⁶Contractionary demand effects of reductions in government expenditures during the transition are discussed in Laski (1994), Rosati (1994), and Cheasty and Davis (1996). Fiscal developments can, however, affect output in other ways too. For example, Chadha and
(continued...)

Impact of the budget

The evolution of the government financial position from 1992 onwards, the first year in which the country could conduct its own fiscal policy, mainly reflects the sharp decline in revenue as a percentage of GDP, from an estimated 39 percent in 1992 to about 24 percent in 1995 (see Appendix Table 17).²⁷ Part of the revenue decline was due to the loss of substantial intergovernmental transfers from Russia, which until mid-1993 had replaced the pre-1992 Union transfers.²⁸ An erosion of the traditional tax bases in excess of the decline in GDP, and difficulties in replacing the Soviet taxes with market-oriented forms of taxation further contributed to the revenue decline.²⁹ In addition, tax evasion, tax arrears, and tax deferrals granted to selected enterprises increased.³⁰

As restrictive fiscal policy brought about a reduction in the general government deficit from more than 7 percent of GDP in 1992 to less than 2 percent in 1995, total expenditure contracted even more than revenue, from around 45 percent of GDP to somewhat more than 25 percent of GDP over the same period. Expenditure cuts mainly affected transfers to households (cut by 6 percent of GDP in 1992-95, primarily on account of a reduction in pension payments and the elimination of consumer subsidies); (ii) public investment outlays (6 percent of GDP); and (iii) operations and maintenance expenditures for public services (4 percent of GDP). At the same time, the government in 1994-95 had to meet additional expenditure needs resulting from the arrears clearing operation in early 1994 and from calls on state guarantees on domestic and foreign credits. Increasing pressures on expenditures also led to budgetary payment arrears, mainly on wage and social safety net related expenditures.³¹

²⁶(...continued)

Coricelli (1994) develop a model of sectoral reallocation from state to private sector, and show that fiscal constraints may induce the government to maintain the state sector, thereby delaying the transition process; Coricelli (1996) makes a similar argument.

²⁷See World Bank (1997b).

²⁸The loss was not offset by the emergence of equivalent net transfers from non-FSU sources to finance the budget; in 1994-95 such transfers amounted to only around 2 percent of GDP.

²⁹For instance, tax reforms significantly reduced the tax burden on enterprises. The profit tax rate was reduced from an estimated average 55 percent in 1990 to a maximum corporate tax rate of 30 percent in 1995.

³⁰The stock of tax arrears was estimated at 1.6 percent of GDP at the end of 1995.

³¹At the end of 1994, budgetary arrears stood at over 2 percent of GDP; they were reduced to around 1 percent of GDP at the end of 1995.

While the fall in tax revenues appears to have been largely endogenous to the transition process, additional expenditure cuts to reduce the budget deficit may very well have had an autonomous contractionary demand effect, which is, however, not directly quantifiable.³² Moreover, reductions in government expenditures may have had sectoral effects, as they fell disproportionately on the construction sector and on the machine building (military hardware) industry. A consistent economic classification of expenditures that would allow a more disaggregated analysis of the implications of expenditure policies is not available.

Other demand components

Other demand components include net exports and private sector consumption and investment. The 1990-95 data reveal two clear trends: an increase in net exports in percent of GDP, as the post-Soviet trade shock affected imports more than exports, and a fall in investment driven by declining gross capital formation. Private sector consumption and savings, the latter residually computed, appear not to have changed significantly as a share of GDP during 1991-95, although this finding may reflect the particularly weak quality of the data. Independent, survey based, data on money income and expenditure of the population do not allow to identify clear trends in private consumption and savings either. Overall, demand shocks originating in autonomous changes in government expenditures, investment and net exports may very well have affected output developments in Kazakhstan during the transition. However, their contribution cannot be properly quantified.

VI. CONCLUSION

The output decline in the wake of the breakdown of the Soviet economic system far exceeded initial expectations. This paper, on the basis of a detailed analysis of the available evidence for Kazakhstan, sheds new light on the causes and dynamics of the decline. The Kazakh data, while suffering from significant shortcomings, make it possible to obtain a fairly accurate picture of output and its determinants at the outset and during the early years of the transition. The causes of the output decline appear to be diverse and complementary, and reflect both the legacy of central planning and factors specific to the transition.

Kazakhstan inherited an inefficient and highly distorted economy following the dissolution of the Soviet Union. The legacy of central planning was manifested in excessive capital accumulation and severe sectoral misallocation due to an administratively imposed distorted relative price structure. The paper's findings indicate that capital downsizing and the movement toward a market determined sectoral allocation have been important factors in explaining the output decline. At the same time, correcting the inefficiencies and distortions of

³²Most studies on transition economies fail to find significant effects of fiscal contractions on output (e.g. Chu and Schwartz (1994), and Coricelli (1996)).

the planned economy has created the conditions for the resumption of growth from 1996 onwards.

In addition to the legacy of central planning, a number of transition related factors have played a role. Partly as a consequence of continuing government interference, in interstate trade especially, the move from central planning toward market based input and sales linkages resulted in significant short-run output disruptions. Credit contractions and autonomous reductions in aggregate demand components, cuts in government expenditures in particular, may also have added to the output decline, but the evidence is not very strong.

Finally, the limitations of aggregate or industry level evidence, the focus of this paper, have to be kept in mind. To more properly identify and quantify the contribution of a number of factors referred to, such as organizational problems and credit constraints, enterprise level data would be needed. Other factors contributing to the output decline, structural weaknesses in the regulatory, judicial, and tax systems for instance, could also be studied on the basis of this information. Survey work at the enterprise level to supplement the evidence in this paper is therefore a promising avenue for further research.

APPENDIX I. AGRICULTURAL SECTOR

Agriculture remains one of the key activities in the Kazakh economy, accounting for more than 20 percent of employment, and is the sector that has been most affected by the transition process. A somewhat more detailed analysis of developments in this sector illustrates the role in the output decline of factors that are common to all sectors--falling productivity, disorganization, misallocation, and credit constraints and reduced government subsidies--and highlights the causes of agriculture's weakening sectoral position.

As was the case in other major production sectors, both output and productivity in agriculture declined substantially during the transition. The decline affected all major crops and livestock based agricultural products (Agricultural Appendix Table 1). While yearly data on crop production are highly volatile, 5-year average numbers clearly illustrate the underlying trend decline (Agricultural Appendix Table 2). In addition to reductions in sown areas and livestock (Agricultural Appendix Tables 3 and 4),³³ productivity fell. Crop yields in particular were affected as less fertilizer was applied and machinery was depleted, and yields for most crops were reported to be at all-time low levels in 1995 (Agricultural Appendix Table 5); productivity in the output of livestock commodities has also fallen.

The breakdown of the *traditional trade and supply linkages* is reflected in data on interstate trade and state procurement. In the Soviet era, Kazakhstan was the largest grain exporter to other parts of the Soviet Union; grain shipments to the rest of the USSR were of the order of up to 10 million tons.³⁴ Kazakhstan also exported each year around 300 thousand tons of meat, 250 thousand tons of milk, and 150 million eggs to the other republics. Agricultural interstate trade fell throughout the transition as production declined and the government tried to protect domestic supplies by imposing trade restrictions, export tariffs on wheat for instance. With controls to assure domestic supplies in place, per capita consumption of agricultural products declined significantly less than output (see Agricultural Appendix Table 6). State procurement in the agricultural sector traditionally accounted for most of output. The planning-based procurement system, however, gradually broke down during the transition, a development that is reflected in the evolution of deliveries under the state order and state needs systems (see Agricultural Appendix Table 7). Targeted and actual deliveries were in line with the pre-transition numbers while the planning inherited state order system was in place during 1992-93. The transition to a less restrictive state needs system in 1994 marked the end of the traditional role of government in controlling production and sales in agriculture; the system rapidly broke down and was abolished in 1995. With the elimination of

³³Inventories of hogs and sheep and goats almost halved, while the cattle inventory declined by 30 percent.

³⁴Grain shipments were highly variable, depending on the total harvest, available stocks and demand.

government based procurement channels, barter trade gained in importance; according to official estimates, such trade accounted for about one third of agricultural sales in 1995.

With the agricultural sector in overall decline, opportunities within the sector changed as well, and farmers began to respond to *new market signals*. The distribution of sown areas has changed, with a reduction in the area used for grain and an increase in that used for sunflowers (used as in kind payment to farm workers). More importantly, activity on household plots and in small agricultural enterprises and individual farms increased sharply. The number of household plot holders doubled during the transition, and more than 500,000 hectares (equivalent to around 10 percent of agricultural land used for permanent crops and meadows) were held as household, garden and dacha plots in 1995. Individual farms and small agricultural enterprises also mushroomed. Whereas in 1990, only around 300 individual farms were operating and no agricultural enterprises other than state farms and collective farms existed, in 1995 there were approximately 28,000 individual farms and more than 2300 small agricultural enterprises. As a result, the role of private farm activity has increased significantly: in 1990 private farming accounted for less than 10 percent of crop production and around 40 percent of animal husbandry, but by 1995 its share had increased to more than 25 percent and more than 65 percent, respectively. Yield data according to form of organization indicate that during 1991-95 productivity declined less on private plots than in former state farms, and the shift toward private activity in agriculture therefore appears to have mitigated the sector's overall decline.

The agricultural sector was confronted with a *sharp reduction in credit* as government subsidized loans were virtually eliminated, while commercial credit remained very limited. In the early years of the transition, the agricultural sector received substantial financial support from the government in the form of soft loans and subsidies. Until 1994, the Agroprombank--the reorganized institution based on the Soviet-era agricultural credit distribution network--retained its monopolistic position on banking operations for the agro-food sector, including the channeling of subsidized loans. In 1993, government subsidized credits to the agricultural sector still amounted to around 5 percent of GDP. When the bank failed in 1994, the government created a Fund for Agricultural Financial Support (FAFS) as part of the reorganization effort. The FAFS assumed state farm debt for unpaid soft loans that had been advanced to finance production in 1993 and 1994. Besides subsidizing loans, at a reduced scale, the government in 1994 continued to appropriate money for rural social development, purchase of breeding livestock and seed, and similar purposes. In 1995, most state support was channeled through the FAFS, which received an appropriation of Tenge 3.4 billion (0.3 percent of GDP) to reimburse for fertilizer, seed, agro-chemical purchases and to subsidize soft credits and sheep-raising. Bank credit to the agricultural sector fell to very low levels; at the end of 1995, outstanding bank loans to the sector were less than 1 percent of annualized last-quarter GDP. Direct government subsidies to farmers also have been sharply curtailed. From a peak of around 10 to 12 percent of GDP prior to independence, direct subsidies fell to around 2 to 3 percent of GDP in 1993, and were further reduced during 1994-95.

The same factors that account for the overall output decline in the Kazakh economy were also at work in the agricultural sector. However, the productivity fall and financial deterioration in agriculture exceeded those in other sectors. Agriculture's weakening position reflects two sector specific developments. First, the sector has begun to act as a labor reservoir for labor released elsewhere. The reduction in employment in agriculture, around 14 percent in 1995 relative to the 1990 level, was the smallest among the five sectors of the material production sphere. Moreover, agriculture suffered from a major terms of trade loss following price liberalization. In 1992-93, prices in agriculture as measured by the sector's implicit GDP price deflators, increased by only half as much as those in other sectors. According to World Bank estimates, in 1993, the prices of inputs used in agriculture increased by 18.8 times while output prices increased by 7.8 times.³⁵ This terms of trade loss was not reversed in subsequent years, and was a key factor behind the sector's growing financial distress. While, according to official statistics, the sector as a whole was still profitable in 1992, it had small net losses of 0.3 percent of GDP in 1993 (See Agricultural Appendix Table 8). The weakening financial position of farms was also reflected in a sharp increase in the number of loss-making farms; around 50 percent of the large-scale farms reported losses in 1993, up from 13 percent the year before. Financial conditions further deteriorated from then on, and in 1995 almost 80 percent of the large-scale farms were reporting losses. The sectoral deficit amounted to more than 2 percent of GDP, and farms were incurring losses on the sale of almost all major agricultural products.³⁶ The losses resulted in an accumulation of arrears on bank loans to agriculture, which in turn led to a sharp rationing in new lending to the sector.

³⁵For instance, in 1992, 49 tons of wheat were needed to purchase a grain combine and 1.9 tons to purchase a ton of fertilizer. In 1993, these amounts had increased to 233 and 23.3 tons, respectively.

³⁶An interesting exception are sunflowers, the production and sale of which remained highly profitable. As a result, the area sown with sunflowers increased by almost 150 percent in between 1990 and 1995.

Agricultural Appendix, Table 1. Kazakhstan: Agricultural Output, 1980-1995
(In thousands of tons)

| | 1980 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 |
|------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|------|
| Crop production | | | | | | | | | | | | |
| Grains | 25930 | 22694 | 26562 | 25721 | 20970 | 18797 | 28488 | 11992 | 29772 | 21631 | 16454 | 9505 |
| Wheat | 17548 | 14191 | 16743 | 16108 | 12162 | 10784 | 16197 | 6889 | 18285 | 11585 | 9052 | 6490 |
| Barley | 6405 | 6357 | 7580 | 7409 | 6307 | 5727 | 9303 | 3412 | 9482 | 7909 | 5497 | 2208 |
| Rye | 129 | 144 | 394 | 364 | 587 | 784 | 889 | 506 | 568 | 889 | 264 | 84 |
| Oats | 691 | 570 | 656 | 490 | 372 | 283 | 681 | 265 | 831 | 906 | 822 | 250 |
| Maize | 414 | 598 | 505 | 477 | 561 | 479 | 442 | 330 | 368 | 355 | 234 | 136 |
| Seedcotton | 358 | 305 | 333 | 312 | 325 | 315 | 324 | 291 | 252 | 200 | 208 | 223 |
| Sugar beet | 2223 | 1901 | 1721 | 1804 | 1321 | 1188 | 1134 | 726 | 1276 | 925 | 433 | 371 |
| Potatoes | 2238 | 2197 | 2137 | 2066 | 2260 | 1783 | 2324 | 2143 | 2570 | 2296 | 2040 | 1720 |
| Vegetables | 1134 | 1085 | 1211 | 1190 | 1354 | 1254 | 1136 | 955 | 985 | 808 | 781 | 780 |
| Total meat | 1069 | 1133 | 1300 | 1399 | 1493 | 1573 | 1560 | 1524 | 1258 | 1312 | 1207 | 985 |
| Beef and veal | 465 | 506 | 580 | 632 | 689 | 727 | 710 | 724 | 596 | 662 | 642 | 548 |
| Pigmeat | 195 | 185 | 2219 | 245 | 255 | 273 | 275 | 274 | 217 | 194 | 158 | 113 |
| Mutton, lamb and goat | 231 | 221 | 253 | 258 | 279 | 289 | 285 | 270 | 243 | 275 | 252 | 206 |
| Poultry | 126 | 166 | 191 | 198 | 201 | 210 | 201 | 185 | 139 | 114 | 80 | 53 |
| Milk | 4597 | 4763 | 5040 | 5185 | 5321 | 5563 | 5642 | 5555 | 5265 | 5577 | 5296 | 4619 |
| Wool | 103 | 97 | 106 | 106 | 108 | 110 | 108 | 104 | 97 | 95 | 75 | 58 |
| Eggs | 3369 | 3803 | 4097 | 4189 | 2402 | 4253 | 4185 | 4075 | 3565 | 3288 | 2629 | 1841 |

Agricultural Appendix, Table 2. Kazakhstan: 5-year Average Output for Crops, 1990-95
(In thousands of tons)

| | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 |
|------------|-------|-------|-------|-------|-------|-------|-------|
| Grains | 22949 | 24108 | 21194 | 22004 | 22136 | 21667 | 17871 |
| Wheat | 13998 | 14399 | 12428 | 12863 | 12748 | 12402 | 10460 |
| Barley | 6676 | 7265 | 6432 | 6846 | 7167 | 7121 | 5702 |
| Rye | 455 | 604 | 626 | 667 | 727 | 623 | 462 |
| Oats | 474 | 496 | 418 | 486 | 593 | 701 | 615 |
| Maize | 524 | 493 | 458 | 436 | 395 | 346 | 285 |
| Seedcotton | 318 | 322 | 313 | 301 | 276 | 255 | 235 |
| Sugar beet | 1587 | 1434 | 1235 | 1129 | 1050 | 899 | 746 |
| Potatoes | 2089 | 2114 | 2115 | 2216 | 2223 | 2275 | 2154 |
| Vegetables | 1219 | 1229 | 1178 | 1137 | 1028 | 933 | 862 |

Agricultural Appendix, Table 3. Kazakhstan: Inputs for Crop Production, 1980-1995

| | 1980 | 1985 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 |
|-----------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|
| <i>(in thousands of units)</i> | | | | | | | | |
| Tractors | 239 | 270 | 220 | 219 | 217 | 212 | 196 | 170 |
| Grain combines | 110 | 119 | 89 | 87 | 84 | 79 | 71 | 65 |
| <i>(in thousand of tons)</i> | | | | | | | | |
| Mineral fertilizer | 520 | 939 | 665 | 531 | 450 | 226 | 71 | 36 |
| <i>(in thousands of hectares)</i> | | | | | | | | |
| Total sown areas | 36390 | 35796 | 35182 | 34936 | 34840 | 34060 | 31672 | 28659 |
| All grains | 25340 | 25129 | 23356 | 22753 | 22596 | 22250 | 20706 | 18816 |
| Seedcotton | 127 | 131 | 120 | 117 | 112 | 110 | 111 | 110 |
| Sugar beet | 78 | 72 | 44 | 45 | 85 | 69 | 56 | 40 |
| Sunflowers | 103 | 104 | 137 | 190 | 298 | 271 | 281 | 337 |
| Potatoes | 191 | 191 | 206 | 217 | 247 | 244 | 218 | 204 |
| Vegetables | 66 | 65 | 71 | 75 | 83 | 74 | 75 | 71 |

Agricultural Appendix, Table 4. Kazakhstan: End-period Livestock Inventories, 1990-95

| | 1980 | 1985 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 |
|--------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|
| <i>(in thousands of heads)</i> | | | | | | | | |
| Cattle | 8693 | 9165 | 9757 | 9592 | 9576 | 9347 | 8073 | 6860 |
| of which: Cows | 2985 | 3087 | 3368 | 3490 | 3623 | 3687 | 3397 | 3045 |
| Hogs | 3093 | 2968 | 3224 | 2976 | 2591 | 2445 | 1983 | 1623 |
| Sheep and goats | 35208 | 35485 | 35661 | 34556 | 34420 | 33133 | 25132 | 19584 |
| Horses | 1300 | 1455 | 1626 | 1666 | 1704 | 1777 | 1636 | 1557 |
| Poultry | 48092 | 55436 | 59899 | 59932 | 52733 | 52591 | 38239 | 19118 |

Agricultural Appendix, Table 5. Kazakhstan: Crop Yield, 1980-1995
(In kilograms per hectare)

| | 1980 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 |
|--------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Annual average yield | | | | | | | | | | | | |
| Grains | 1020 | 900 | 1080 | 1050 | 860 | 790 | 1220 | 530 | 1320 | 1000 | 790 | 500 |
| Winter wheat | 1090 | 940 | 1250 | 1950 | 1480 | 1320 | 1640 | 1080 | 1430 | 1500 | 890 | 780 |
| Spring wheat | 1020 | 870 | 1060 | 980 | 770 | 700 | 1110 | 460 | 1310 | 800 | 700 | 500 |
| Spring barley | 1050 | 930 | 1130 | 1070 | 890 | 840 | 1390 | 500 | 1650 | 110 | 910 | 460 |
| Rye | 490 | 630 | 910 | 740 | 1020 | 1080 | 1160 | 900 | 910 | 1500 | 820 | 480 |
| Oats | 1400 | 1620 | 1460 | 1010 | 1060 | 690 | 1780 | 520 | 1820 | 1700 | 1280 | 510 |
| Maize | 4300 | 4450 | 4250 | 4030 | 4090 | 3580 | 3440 | 2720 | 2910 | 3000 | 2080 | 1580 |
| Seedcotton | 2830 | 2340 | 2590 | 2440 | 2540 | 2640 | 2710 | 2500 | 2250 | 1800 | 1870 | 2030 |
| Sugar beet | 28500 | 26400 | 27900 | 32000 | 31610 | 26690 | 25990 | 15900 | 15000 | 13500 | 8340 | 9790 |
| Potatoes | 11700 | 11530 | 11200 | 10830 | 11200 | 8570 | 11290 | 9890 | 10400 | 9400 | 9350 | 8350 |
| Vegetables | 16700 | 16100 | 17900 | 16500 | 16900 | 15620 | 15440 | 12100 | 11400 | 10600 | 10390 | 10060 |
| Five year average yield | | | | | | | | | | | | |
| Grains | ... | ... | ... | ... | ... | 936 | 1000 | 890 | 944 | 972 | 972 | 828 |
| Winter wheat | ... | ... | ... | ... | ... | 1388 | 1528 | 1494 | 1390 | 1394 | 1308 | 1136 |
| Spring wheat | ... | ... | ... | ... | ... | 876 | 924 | 804 | 870 | 876 | 876 | 754 |
| Spring barley | ... | ... | ... | ... | ... | 972 | 1064 | 938 | 1054 | 898 | 912 | 726 |
| Rye | ... | ... | ... | ... | ... | 876 | 982 | 980 | 1014 | 1110 | 1058 | 922 |
| Oats | ... | ... | ... | ... | ... | 1168 | 1200 | 1012 | 1174 | 1302 | 1420 | 1166 |
| Maize | ... | ... | ... | ... | ... | 4080 | 3878 | 3572 | 3348 | 3130 | 2830 | 2458 |
| Seedcotton | ... | ... | ... | ... | ... | 2510 | 2584 | 2566 | 2528 | 2380 | 2226 | 2090 |
| Sugar beet | ... | ... | ... | ... | ... | 28920 | 28838 | 26438 | 23038 | 19416 | 15746 | 12506 |
| Potatoes | ... | ... | ... | ... | ... | 10666 | 10618 | 10356 | 10270 | 9910 | 10066 | 9478 |
| Vegetables | ... | ... | ... | ... | ... | 16604 | 16472 | 15312 | 14292 | 13032 | 11986 | 10910 |

Agricultural Appendix, Table 6. Kazakhstan: Annual per Capita Food Consumption, 1980-1995
(In kilogrammes)

| | 1980 | 1985 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 |
|-------------------------|------|------|------|------|------|------|------|------|
| Meat and meat products | 55 | 57 | 71 | 71 | 61 | 59 | 56 | 51 |
| Milk and dairy products | 273 | 260 | 307 | 304 | 270 | 260 | 245 | 226 |
| Sugar | 39 | 37 | 34 | 30 | 26 | 18 | 18 | 18 |
| Potatoes | 87 | 90 | 85 | 75 | 86 | 80 | 75 | 63 |
| Cereal products | 147 | 146 | 146 | 147 | 153 | 180 | 191 | 176 |

Source: OECD.

Agricultural Appendix, Table 7. Kazakhstan: State Procurement of Agricultural Products, 1980-1995
(thousand tons)

| | 1980 | 1985 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 |
|--|-------|-------|-------|-------|-------|------|-------|------|
| Actual deliveries, thousand tons | | | | | | | | |
| Grain | 15753 | 13840 | 14819 | 3449 | 13137 | 6930 | 4172 | 809 |
| Seedcotton | 358 | 305 | 324 | 290 | 246 | 198 | 206 | ... |
| Sugar beets | 2095 | 1767 | 1034 | 616 | 441 | 256 | 1 | ... |
| Sunflower seeds | 72 | 60 | 110 | 53 | 46 | 2 | 0 | ... |
| Potatoes | 636 | 641 | 571 | 359 | 265 | 137 | 55 | ... |
| Fruits and berries | 102 | 68 | 118 | 21 | 54 | 36 | 13 | ... |
| Vegetables | 780 | 803 | 676 | 454 | 309 | 157 | 82 | ... |
| Melons | ... | 223 | 162 | 147 | 48 | 14 | 1 | ... |
| Livestock and poultry | 1294 | 1284 | 1884 | 1551 | 917 | 793 | 412 | ... |
| Milk and dairy products | 2310 | 2657 | 3294 | 2925 | 2132 | 2069 | 1396 | ... |
| Eggs 1/ | 1929 | 2262 | 2573 | 2356 | 1660 | 1527 | 1062 | ... |
| Wool | 54 | 53 | 60 | 59 | 42 | 37 | 5 | ... |
| In percent of targeted deliveries | | | | | | | | |
| Grain | ... | ... | 90.4 | 23.5 | 131.4 | 99.0 | 59.6 | 16.2 |
| Sugar beets | ... | ... | 86.2 | 51.4 | 52.5 | 38.6 | 0.1 | ... |
| Sunflower seeds | ... | ... | 64.7 | 34.6 | 43.0 | 2.5 | 0.1 | ... |
| Potatoes | ... | ... | 112.2 | 66.5 | 147.2 | 91.3 | 36.7 | ... |
| Vegetables | ... | ... | 90.3 | 59.0 | 304.4 | 98.1 | 51.3 | ... |
| Livestock and poultry | ... | ... | 123.7 | 102.4 | 86.8 | 90.5 | 171.7 | ... |
| Milk and dairy products | ... | ... | 106.2 | 90.6 | 94.3 | 98.5 | 146.9 | ... |
| Eggs 1/ | ... | ... | 111.0 | 97.0 | 97.4 | 95.4 | 195.9 | ... |
| Wool | ... | ... | 101.2 | 105.4 | 107.9 | 94.9 | .. | ... |
| In percent of total production | | | | | | | | |
| Grain | 60.8 | 61.0 | 52.0 | 28.8 | 44.1 | 32.0 | 25.4 | 8.5 |
| Seedcotton | 100.0 | 100.0 | 100.0 | 99.7 | 97.6 | 99.0 | 99.0 | ... |
| Sugar beets | 94.2 | 93.0 | 91.2 | 84.9 | 34.6 | 27.7 | 0.2 | ... |
| Sunflower seeds | 72.0 | 64.5 | 78.0 | 49.1 | 37.7 | 1.9 | 0.2 | ... |
| Potatoes | 28.4 | 29.2 | 24.6 | 16.8 | 10.3 | 6.0 | 2.7 | ... |
| Fruits and berries | 39.7 | 51.1 | 39.2 | 7.0 | 55.1 | 21.3 | 13.0 | ... |
| Vegetables | 68.8 | 74.0 | 59.5 | 47.5 | 31.4 | 19.4 | 10.5 | ... |
| Livestock and poultry | 121.0 | 113.3 | 120.8 | 101.8 | 72.9 | 60.4 | 39.3 | ... |
| Milk and dairy products | 50.3 | 55.8 | 58.4 | 52.7 | 40.5 | 37.1 | 27.2 | ... |
| Eggs | 57.3 | 59.5 | 61.5 | 57.8 | 46.6 | 46.4 | 38.3 | ... |
| Wool | 52.1 | 54.4 | 30.4 | 56.7 | 44.1 | 38.9 | 6.3 | ... |

1/ Million units

Agricultural Appendix, Table 8. Kazakhstan: Profitability Indices, 1990-1995
(In percent)

| | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 |
|--|-------|-------|-------|-------|-------|-------|
| Share of loss making farms | 3.6 | 11.8 | 13.1 | 50.4 | 62.3 | 78.5 |
| Sectoral surplus (deficit) to GDP ratio | 10.6 | 7 | 7.8 | -0.3 | -1.1 | -2.1 |
| Ratio of deflators | 98.1 | 97 | 41.7 | 59.8 | 93.6 | 109.2 |
| Profit (loss) rate from selling agricultural products | | | | | | |
| All products | 38.5 | 34 | 60.4 | -1.7 | -7 | -15.6 |
| Crops | 105.4 | 87.8 | 151.7 | 28.2 | 21.1 | -2.9 |
| Grain | 164.2 | 127.7 | 186.4 | 28 | 8.4 | -3.8 |
| Sunflower | 280.6 | 207.8 | 303 | 163.7 | 96.4 | 107.2 |
| Sugarbeet | 8.1 | 0.9 | 53.3 | 1.7 | -25.1 | -18.5 |
| Vegetables | 18.8 | 41 | 24.3 | 50.7 | 50.1 | -3.2 |
| Potatoes | 22.5 | 57.9 | 60.1 | 45.9 | 49.1 | 10.9 |
| Fruits | 25.5 | 46.4 | 34.2 | 36.9 | 8.9 | -7.7 |
| Livestock products | 18.9 | 24.9 | -4.9 | -27.7 | -26.3 | -30.7 |
| Milk and milk products | 35.5 | 2.4 | -32.4 | -48.2 | -39.1 | -29.2 |
| Cattle | 7.8 | 11.6 | 0.3 | -24 | -22.1 | -34.7 |
| Pigs | 10.9 | 6.3 | -7.7 | -15.8 | -24.4 | -44.9 |
| Sheep and goat | 69.9 | 45.2 | 32.8 | -11.1 | -7.3 | -31.2 |
| Poultry | 24.8 | 8.9 | -13.5 | 1.3 | -34.5 | -42.4 |
| Wool | 21.6 | 67.9 | -1.9 | -49.3 | -58.3 | -52.2 |
| Eggs | 44.4 | 62.3 | 28.8 | 40.8 | 16.9 | -2.3 |

APPENDIX II. DATA: SOURCES, DEFINITIONS, AND ADJUSTMENTS

The Kazakh National Statistical Agency (KNSA) publishes an extensive amount of data in its annual Statistical Yearbook and accompanying surveys of a number of sectors and activities. These data are summarized and supplemented with comparative information in the publications of the Statistical Committee of the Commonwealth of Independent States. Detailed and easily accessible data on Kazakhstan are available in the yearly updated World Bank's "Statistical Handbook - States of the Former USSR" and in World Bank (1993) and World Bank (1997b). The IMF's Staff Country Reports on Kazakhstan provide data as well as background information and analysis. Sectoral developments in agriculture are documented, inter alia, in the annual USDA's "Former USSR: International Agriculture and Trade Report" and OECD's "Agricultural Policies, Markets and Trade in Transition Economies. Monitoring and Evaluation." Surveys of Kazakhstan's energy sector can be found in the quarterly Energy Report and the annual "Energy Outlook for Eastern Europe and the former Soviet Republics," as published by PlanEcon. The sources of the data included in the paper and the adjustments to these data are as follows.

Growth accounting framework

Independent series cover the total material production sphere and the five broad sectors within this sphere, namely industry, agriculture, construction, transport and communications, and trade and catering. The described adjustments were applied to each of these series.

Output data

The Kazakh output data are taken from two sources. For the 1970-1989 period, the data are net material product data reported in "comparable prices" with basis in 1973; these are taken from Easterly and Fischer (1994), and checked against the Kazakh statistical yearbooks (Narkoz). The output series is extended from 1990 onwards using annual total and sectoral real growth rates, as reported by the KNSA, including the revised 1991-94 numbers in the Report on the National Accounts (World Bank, 1997a).

The output data have two major shortcomings. First, they rely on physical volume data that often do not capture the full extent of changes in product mix and quality. Second, the 1970-1989 data are reported in "comparable prices" that do not fully exclude the effects of price changes. Almost all FSU experts³⁷ believe that these data overstate growth because they include a substantial degree of disguised inflation. This inflation had two main sources. First, prices increased since producers had an incentive to make minor changes to their products which would serve as an argument for an increase in the price. Second, prices for products

³⁷Compare Steinberg (1990), Noren and Kurtzweg (1993), and U.S. Government Printing Office (1990).

reflecting genuine improvements were not reduced even after research and development costs had been recovered.

Whereas the shortcomings in the physical volume data cannot be remedied, the Kazakh output data for the 1970-1989 period were adjusted for disguised inflation by deflating the series using a deflator based on U.S. Government research (U.S. Government Printing Office (1990)). The U.S. Government estimated the growth of Soviet GDP by converting "comparable prices" to adjusted factor costs by (1) subtracting turnover and other indirect taxes; (2) adding subsidies; (3) removing profit margins; and (4) adding-back a calculated return on capital. The correction factor for disguised inflation for the Kazakh data was constructed by dividing the U.S. Government growth series by official Soviet growth data for the period of 1970 to 1989, assuming that Kazakh and overall Soviet price movements were similar. No further correction was applied to the 1990-1995 output data, as from 1990 onwards total and sectoral growth rates were computed using the prices of the previous year (chain weighted method) and as there are no indications that this new method failed to eliminate the systematic inflation bias in the computation of the rate of change of real output. The whole series was rebased in 1984 prices using current price series as reported by the World Bank (World Bank, 1997b).

Investment data

The investment data are taken from the Kazakh statistical yearbooks and from the publication "Capital Construction in the Republic of Kazakhstan". The Kazakh sources report data both on "financial resources used for investment purposes" and on "capital put into operation" (value of completed investment projects).

Kazakh investment data are reported in either comparable or current prices. The data on "financial resources used for investment purposes" for the 1970-1990 period are reported in "comparable prices," based in 1973 for the 1970-1984 data and based in 1984 for the 1984-1990 data; the 1991-1995 data are expressed both in 1991 comparable prices and in current prices.³⁸ The data on "capital put into operation" for the 1970-1990 period are reported in comparable prices, based in 1973 and rebased in 1984, while for the 1991-1995 period these data are only available in current prices.³⁹ A 1991-1995 series for "capital put into operation" in comparable prices was computed by multiplying the data on "financial resources used for

³⁸The conversion factors applied by the Kazakh statistical authorities to go from 1973 comparable prices to 1984 and to 1991 comparable prices imply an increase in prices of investment goods of 14 and 63 percent respectively.

³⁹The sectoral data on "capital put into operation" for the 1970-1980 period are available as five-year averages only. Annual sectoral data for this period were derived by applying the five-year average sectoral ratios to the annual total numbers.

investment purposes” in comparable prices with the ratio of the two investment series in current prices. The whole series was rebased in 1984.

As for output data, Kazakh investment data reported in “comparable prices” overstate the real growth of investment goods and services.⁴⁰ In order to fully correct the investment series for inflation, the data were adjusted by:

- disaggregating the investment series into investment expenditures on buildings and structure and on machinery and equipment according to the composition of investment by type as reported in Kellogg (1990);
- deflating the two investment components according to inflation estimates for investment by type as derived in Kellogg (1990);
- reassembling the investment series.⁴¹

Capital data

Kazakh data on the composition of broadly defined investment were used to construct a capital stock series according to

$$K_t = \delta K_{t-1} + I_t ,$$

where K denotes the capital stock, δ the depreciation rate, and I investment. The capital stock reported for 1970 was taken as the basis. For the depreciation rate, the ratio of capital retirements to capital stock as based upon data on depreciation expenditures during 1985-90 and depreciation data provided by Kellogg (1990) were used. For investment, the adjusted investment series for “capital put into operation” were employed.

⁴⁰“Comparable 1973 prices” are defined as prices used for project estimates and for planning and reporting purposes “as of January 1 1969, adjusted to account for new wholesale prices on machinery as of January 1 1973 and coefficients reducing construction and installation work as of January 1 1976.” The concept of “comparable prices” is therefore not adjusted for inflation.

⁴¹Kellogg (1990) derives the inflation of the investment components for the time period 1960 to 1987. For 1988 to 1990, the average inflation for the 1983-1987 period was applied as correction. No further adjustment was made to the data from 1991 on.

Employment data

The annual employment data for the 1970-1990 period are taken from Easterly and Fischer (1994), and checked against the numbers reported in the Kazakh statistical yearbooks. The employment data from 1991 were provided by the Kazakh statistical authorities and the Statistical Committee of the Commonwealth of Independent States.

Income share data

The share of labor income is derived from data on the yearly average wage bill and net material product data for the 1985-1989 period. Income based national accounts data for the transition period are only available on an experimental basis, and appear to underestimate the labor income share.

Data on the breakdown of interstate trade links

Data on interstate trade come from annual trade surveys by the Kazakh statistical authorities and by the Statistical Committee of the Commonwealth of Independent States.

Data on the sectoral reallocation of labor

All data in this section have either been provided by the Kazakh statistical authorities or taken from Kazakh statistical yearbooks.

For employment, data originate from three different sources: (i) monthly data with a breakdown of employment in major state and privatized former state enterprises (the reporting of employment in privatized enterprises differs according to sector: most of the privatized enterprises in the industry still report data to the statistical agencies, while privatized enterprises in the agricultural sector often stopped reporting; employment in new private sector activities is generally not included); (ii) more detailed quarterly data for state and former state enterprises, including a breakdown of employment within industry; and (iii) survey based annual data including estimates of employment in the private sector; these data have been used for the growth accounting framework. A comparison of the three data sets indicates that the reporting system is deteriorating rapidly (particularly in the agriculture and trade sectors). Data on labor turnover are reported only for state and former state enterprises.

For wages, there are three corresponding data sets.

Data on the credit crunch

Data on monetary aggregates have been provided by the National Bank of Kazakhstan; all other data stem from the KNSA.

Data on aggregate demand components

Data on the fiscal sector were either provided by the Ministry of Finance or originate from the World Bank (1997b). Data on income and expenditure of the population and on stocks have been provided by the KNSA.

Appendix Table 1. Kazakhstan: Production Indices for Selected Industrial Commodities, 1980-1995
(1990=100)

| | 1980 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 |
|----------------------------|--------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Electric power | 70.4 | 93.0 | 97.4 | 101.3 | 101.2 | 102.6 | 100.0 | 98.4 | 93.0 | 87.1 | 74.6 | 75.2 |
| Coal | 87.8 | 99.5 | 104.8 | 108.1 | 108.9 | 105.3 | 100.0 | 99.2 | 96.3 | 85.1 | 79.4 | 63.4 |
| Oil | 72.3 | 88.5 | 91.7 | 94.7 | 98.8 | 98.3 | 100.0 | 85.3 | 84.9 | 74.7 | 71.8 | 69.4 |
| Natural gas | 60.6 | 76.7 | 81.9 | 88.7 | 100.3 | 94.3 | 100.0 | 110.8 | 114.1 | 94.3 | 63.1 | 93.4 |
| Gasoline | 41.7 | 60.6 | 48.5 | 85.2 | 106.0 | 107.0 | 100.0 | 101.9 | 96.6 | 83.3 | 63.2 | 62.4 |
| Diesel fuel | 51.0 | 67.4 | 86.5 | 89.7 | 98.3 | 104.7 | 100.0 | 100.7 | 98.2 | 87.8 | 69.8 | 66.4 |
| Bauxite | ... | 94.6 | 93.0 | 91.5 | 89.9 | 99.2 | 100.0 | 94.6 | 93.8 | 89.9 | 80.1 | 102.9 |
| Iron ore | 108.0 | 96.4 | 99.1 | 101.6 | 102.1 | 99.7 | 100.0 | 92.2 | 74.1 | 55.1 | 44.1 | 63.4 |
| Manganese | 26.1 | 43.3 | 44.8 | 56.8 | 71.8 | 78.1 | 100.0 | 102.9 | 171.8 | 45.8 | 151.7 | 146.1 |
| Chrome | 90.2 | 89.0 | 96.1 | 94.0 | 95.8 | 97.6 | 100.0 | 95.6 | 94.3 | 81.1 | 57.5 | 66.0 |
| Cast iron | 90.1 | 94.4 | 93.6 | 91.8 | 94.5 | 101.0 | 100.0 | 94.8 | 89.3 | 67.9 | 46.6 | 48.2 |
| Steel | 88.4 | 91.1 | 96.2 | 97.1 | 100.2 | 101.1 | 100.0 | 94.4 | 90.5 | 69.2 | 44.0 | 44.8 |
| Rolled products | 84.0 | 85.4 | 93.2 | 93.5 | 99.5 | 102.3 | 100.0 | 96.5 | 90.4 | 69.8 | 48.4 | 45.4 |
| Plate | ... | 58.8 | 69.0 | 72.2 | 81.9 | 95.1 | 100.0 | 84.8 | 86.2 | 56.7 | 40.0 | 70.9 |
| Copper | ... | 98.4 | 112.7 | 122.5 | 126.4 | 121.3 | 100.0 | 90.9 | 89.8 | 87.1 | 68.5 | 62.9 |
| Lead | ... | 108.0 | 108.6 | 110.0 | 110.5 | 110.1 | 100.0 | 91.1 | 83.9 | 87.9 | 48.1 | 31.0 |
| Zinc | ... | 111.0 | 111.3 | 109.3 | 111.7 | 107.7 | 100.0 | 83.7 | 73.7 | 75.8 | 48.6 | 47.7 |
| Coke | 116.4 | 110.5 | 114.2 | 112.9 | 112.3 | 111.5 | 100.0 | 91.7 | 85.3 | 66.5 | 47.1 | 48.8 |
| Sulphuric acid | 60.0 | 53.0 | 58.7 | 63.7 | 65.5 | 60.2 | 100.0 | 89.3 | 74.6 | 37.3 | 21.6 | 22.0 |
| Mineral fertilizers | 76.2 | 86.4 | 91.8 | 96.8 | 104.9 | 103.0 | 100.0 | 91.6 | 49.5 | 18.3 | 7.6 | 12.0 |
| Synthetic rubber | 107.6 | 103.9 | 106.3 | 107.3 | 107.6 | 104.7 | 100.0 | 80.2 | 67.6 | 29.8 | 0.0 | 0.0 |
| Tires | ... | 55.2 | 76.4 | 87.8 | 102.5 | 93.1 | 100.0 | 115.1 | 109.4 | 67.7 | 10.1 | 3.1 |
| Metal cutting machines | 117.0 | 110.5 | 102.0 | 83.6 | 85.9 | 89.5 | 100.0 | 92.4 | 71.1 | 44.9 | 16.6 | 2.2 |
| Press-forging machines | 122.7 | 110.4 | 106.5 | 97.1 | 99.0 | 102.7 | 100.0 | 99.3 | 71.4 | 65.2 | 37.0 | 22.9 |
| Press-forging machines UPC | 13.1 | 7.5 | 27.4 | 95.4 | 96.4 | 95.1 | 100.0 | 104.7 | 76.9 | 34.1 | 0.0 | 0.0 |
| Excavators | 253.9 | 264.4 | 259.6 | 147.2 | 80.3 | 81.4 | 100.0 | 87.0 | 44.1 | 29.6 | 4.5 | 0.0 |
| Bulldozers | 66.5 | 102.6 | 108.8 | 114.2 | 111.1 | 114.9 | 100.0 | 77.2 | 25.8 | 31.2 | 5.2 | 3.9 |
| Tractors | 296.7 | 420.0 | 421.0 | 334.2 | 195.4 | 127.2 | 100.0 | 83.1 | 32.7 | 13.7 | 4.8 | 4.4 |
| Wood cutting | 93.4 | 99.0 | 105.3 | 101.5 | 102.8 | 107.5 | 100.0 | 84.4 | 70.4 | 53.9 | 40.2 | 34.2 |
| Industrial wood | 94.9 | 100.1 | 108.0 | 101.4 | 103.0 | 109.2 | 100.0 | 82.7 | 65.1 | 49.8 | 34.7 | 25.4 |
| Customer lumber | 120.9 | 115.4 | 114.6 | 121.2 | 121.5 | 113.4 | 100.0 | 87.6 | 68.9 | 49.2 | 28.6 | 17.1 |
| Wood board | 86.2 | 105.1 | 108.6 | 93.1 | 92.7 | 107.8 | 100.0 | 95.5 | 76.9 | 31.9 | 11.4 | 2.6 |
| Paper | 1165.4 | 715.0 | 39.7 | 106.0 | 178.8 | 192.1 | 100.0 | 68.1 | 45.1 | 139.6 | 47.7 | 11.5 |
| Cardboard | 69.3 | 84.7 | 97.7 | 98.3 | 104.3 | 101.3 | 100.0 | 79.6 | 52.1 | 27.3 | 10.1 | 5.3 |
| Cement | 85.5 | 90.9 | 97.2 | 100.6 | 101.8 | 104.2 | 100.0 | 91.3 | 77.5 | 47.5 | 24.5 | 21.3 |
| Bricks | 86.7 | 85.2 | 89.9 | 99.3 | 103.0 | 108.0 | 100.0 | 93.9 | 77.3 | 59.1 | 35.1 | 18.0 |

Appendix Table I (concluded)

| | 1980 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 |
|------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|------|------|------|
| Concrete | 80.5 | 87.3 | 90.6 | 100.0 | 102.8 | 102.4 | 100.0 | 95.8 | 72.7 | 49.8 | 21.5 | 11.9 |
| Asbestos sheets | 81.8 | 89.1 | 90.3 | 92.6 | 94.3 | 95.7 | 100.0 | 99.8 | 95.2 | 77.4 | 18.8 | 16.2 |
| Roofing | 47.8 | 94.1 | 97.9 | 99.1 | 99.4 | 100.1 | 100.0 | 73.5 | 43.6 | 41.2 | 13.1 | 11.6 |
| Linoleum | 1.7 | 37.2 | 35.1 | 49.1 | 76.4 | 103.1 | 100.0 | 63.7 | 191.4 | 80.9 | 18.8 | 4.0 |
| Ceramic goods | 45.8 | 78.2 | 84.6 | 90.5 | 94.6 | 98.8 | 100.0 | 115.9 | 105.5 | 78.5 | 9.1 | 13.1 |
| Fabrics | 54.7 | 88.9 | 92.2 | 88.6 | 99.4 | 101.3 | 100.0 | 76.5 | 66.3 | 57.5 | 32.7 | 9.4 |
| Cotton fabrics | 74.3 | 87.6 | 90.0 | 79.4 | 97.0 | 98.8 | 100.0 | 88.4 | 88.8 | 89.7 | 56.0 | 14.1 |
| Wool fabrics | 89.2 | 83.6 | 82.7 | 86.3 | 95.9 | 98.5 | 100.0 | 90.9 | 67.0 | 58.8 | 28.7 | 9.9 |
| Rugs | 77.1 | 106.7 | 99.1 | 100.1 | 104.9 | 100.0 | 100.0 | 91.7 | 75.3 | 68.4 | 30.7 | 8.9 |
| Hosiery | 78.6 | 87.4 | 88.0 | 89.2 | 91.8 | 94.1 | 100.0 | 94.8 | 84.6 | 79.7 | 46.7 | 13.1 |
| Knitted wear | 75.4 | 79.1 | 80.7 | 83.1 | 85.3 | 96.7 | 100.0 | 88.1 | 50.6 | 38.2 | 24.9 | 7.2 |
| Shoes | 84.5 | 91.0 | 91.6 | 90.8 | 95.4 | 97.1 | 100.0 | 93.5 | 50.4 | 38.9 | 19.1 | 5.1 |
| Washing machines | 47.7 | 49.9 | 51.2 | 48.1 | 45.2 | 72.0 | 100.0 | 106.4 | 100.7 | 69.4 | 23.9 | 12.6 |
| Radio sets | 0.0 | 10.1 | 18.7 | 32.4 | 63.7 | 73.8 | 100.0 | 116.2 | 130.4 | 96.9 | 5.2 | 0.4 |
| Tape recorders | 39.0 | 62.0 | 64.9 | 69.0 | 75.0 | 80.8 | 100.0 | 65.3 | 56.9 | 61.8 | 57.2 | 11.5 |
| Meat | 67.6 | 74.1 | 89.8 | 94.4 | 96.7 | 105.3 | 100.0 | 94.1 | 70.4 | 61.3 | 45.9 | 30.4 |
| Sausages | 78.1 | 81.2 | 84.8 | 89.8 | 94.9 | 98.4 | 100.0 | 98.3 | 62.4 | 54.5 | 35.7 | 22.5 |
| Fish | 99.5 | 82.5 | 83.2 | 94.1 | 97.6 | 103.0 | 100.0 | 94.9 | 82.0 | 68.0 | 51.8 | 49.8 |
| Butter | 70.6 | 81.4 | 87.5 | 89.3 | 93.6 | 97.9 | 100.0 | 89.4 | 73.9 | 78.6 | 57.1 | 51.1 |
| Cheese | 68.7 | 81.0 | 84.7 | 86.1 | 92.9 | 99.7 | 100.0 | 94.5 | 64.4 | 63.6 | 52.0 | 33.0 |
| Milk | 75.3 | 83.4 | 86.4 | 97.5 | 100.1 | 101.5 | 100.0 | 94.8 | 73.1 | 45.8 | 37.6 | 19.0 |
| Cans | 93.1 | 88.5 | 101.2 | 101.7 | 106.0 | 101.5 | 100.0 | 83.6 | 68.7 | 55.4 | 40.1 | 18.3 |
| Sugar | 85.1 | 105.6 | 107.3 | 109.2 | 98.4 | 118.2 | 100.0 | 96.1 | 63.2 | 38.9 | 23.9 | 32.0 |
| Flour | 93.4 | 100.0 | 98.8 | 98.6 | 97.3 | 100.3 | 100.0 | 102.6 | 100.2 | 98.5 | 97.4 | 80.3 |
| Beverages | 62.0 | 73.1 | 90.3 | 98.6 | 103.4 | 111.4 | 100.0 | 79.5 | 36.2 | 27.0 | 19.7 | 10.8 |
| Confectionary | 78.0 | 85.3 | 88.5 | 91.2 | 94.3 | 98.6 | 100.0 | 81.0 | 56.9 | 42.7 | 29.9 | 11.3 |
| Pasta | 66.7 | 82.1 | 81.8 | 86.8 | 91.9 | 96.5 | 100.0 | 102.4 | 105.4 | 97.9 | 92.6 | 59.5 |
| Vegetable oil | 88.2 | 78.0 | 79.5 | 84.3 | 89.9 | 97.1 | 100.0 | 106.3 | 66.5 | 48.3 | 49.0 | 32.1 |
| Margarine | 106.5 | 117.6 | 117.4 | 111.8 | 121.9 | 120.7 | 100.0 | 66.8 | 48.8 | 25.6 | 22.9 | 3.9 |

Appendix Table 2. Kazakhstan: Electricity Use, 1990-95

| | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 |
|--|-------|-------|-------|-------|-------|------|
| Billion kilowatt hours | | | | | | |
| Total | 104.7 | 101.6 | 96.9 | 89.2 | 79.4 | 73.5 |
| Industry | 61.7 | 58.1 | 52.7 | 44.9 | 36.4 | 35.6 |
| Agriculture | 13.7 | 14.1 | 15.1 | 16.4 | 15.9 | 12.4 |
| Construction | 2.2 | 2.2 | 1.9 | 1.6 | 1.4 | 1.4 |
| Transport and communications | 6.5 | 6.3 | 5.7 | 5.0 | 4.4 | 3.8 |
| <i>Memo items:</i> | | | | | | |
| Municipal services | 7.0 | 7.3 | 7.6 | 7.9 | 7.9 | 6.8 |
| Network losses | 8.2 | 8.1 | 8.8 | 9.2 | 9.6 | 10.2 |
| 1990=100 | | | | | | |
| Total | 100 | 97.0 | 92.6 | 85.2 | 75.8 | 70.2 |
| Industry | 100 | 94.2 | 85.4 | 72.8 | 59.0 | 57.7 |
| Agriculture | 100 | 102.9 | 110.2 | 119.7 | 116.1 | 90.5 |
| Construction | 100 | 100.0 | 86.4 | 72.7 | 63.6 | 63.6 |
| Transport and communications | 100 | 96.9 | 87.7 | 76.9 | 67.7 | 58.5 |
| Output / electricity input ratio (1990=100) | | | | | | |
| Total | 100 | 94.6 | 95.6 | 93.9 | 86.5 | 85.2 |
| Industry | 100 | 106.6 | 97.4 | 98.4 | 88.0 | 82.8 |
| Agriculture | 100 | 75.1 | 90.4 | 77.4 | 62.9 | 63.5 |
| Construction | 100 | 98.0 | 65.0 | 62.7 | 58.6 | 46.5 |
| Transport and communications | 100 | 97.3 | 87.5 | 85.4 | 71.9 | 71.8 |

Appendix Table 3. Kazakhstan: Electricity Use in Industry, 1990-95
(in percent)

| | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 |
|--|-------|-------|-------|-------|-------|-------|
| Million kilowatt hours | | | | | | |
| Total | 61700 | 58100 | 52700 | 44900 | 36403 | 35640 |
| Fuel | 4923 | ... | 4990 | 4805 | 4441 | 3885 |
| Ferrous metallurgy | 10426 | ... | 9297 | 8287 | 8409 | 8981 |
| Nonferrous metallurgy | 8960 | ... | 8364 | 7584 | 7390 | 7199 |
| Chemicals | 13510 | ... | 7780 | 5341 | 3749 | 3528 |
| Machine Building | 3607 | ... | 2762 | 2275 | 1565 | 1283 |
| Paper and woodworking | 318 | ... | 239 | 166 | 146 | 107 |
| Construction Materials | ... | ... | ... | ... | 983 | 855 |
| Light Industry | 989 | ... | 785 | 667 | 437 | 249 |
| Food | 1169 | ... | 998 | 943 | 801 | 891 |
| 1990=100 | | | | | | |
| Total | 100 | 94.2 | 85.4 | 72.8 | 59.0 | 57.8 |
| Fuel | 100 | ... | 101.4 | 97.6 | 90.2 | 78.9 |
| Ferrous metallurgy | 100 | ... | 89.2 | 79.5 | 80.7 | 86.1 |
| Nonferrous metallurgy | 100 | ... | 93.3 | 84.6 | 82.5 | 80.3 |
| Chemicals | 100 | ... | 57.6 | 39.5 | 27.8 | 26.1 |
| Machine Building | 100 | ... | 76.6 | 63.1 | 43.4 | 35.6 |
| Paper and woodworking | 100 | ... | 75.2 | 52.2 | 45.8 | 33.6 |
| Light Industry | 100 | ... | 79.4 | 67.4 | 44.2 | 25.2 |
| Food | 100 | ... | 85.4 | 80.7 | 68.5 | 76.2 |
| Output/electricity input ratio (1990=100) | | | | | | |
| Total | 100 | 106.6 | 97.5 | 98.4 | 88.0 | 82.5 |
| Fuel | 100 | ... | 95.1 | 84.1 | 78.3 | 78.5 |
| Ferrous metallurgy | 100 | ... | 107.7 | 91.3 | 63.4 | 69.7 |
| Nonferrous metallurgy | 100 | ... | 96.5 | 98.1 | 77.7 | 81.3 |
| Chemicals | 100 | ... | 120.5 | 97.2 | 81.6 | 89.6 |
| Machine Building | 100 | ... | 111.9 | 115.9 | 106.0 | 86.7 |
| Paper and woodworking | 100 | ... | 117.0 | 153.8 | 96.6 | 69.2 |
| Light Industry | 100 | ... | 102.0 | 106.0 | 90.2 | 61.3 |
| Food | 100 | ... | 82.6 | 77.2 | 69.2 | 39.0 |

Appendix Table 4. Kazakhstan: Computations of Total Factor Productivity for the Agricultural Sector, 1970 to 1995

(In percent)

| | NMP growth | TFP growth | Labor growth | Capital growth | Inv./ NMP | Cap./ NMP |
|------------------------------|---------------|---------------|-----------------|-------------------|--------------|--------------|
| 1970 | ... | ... | ... | ... | 0.11 | 0.64 |
| 1971 | -0.07 | -0.11 | 0.02 | 0.06 | 0.15 | 0.72 |
| 1972 | 0.12 | 0.05 | 0.01 | 0.14 | 0.14 | 0.74 |
| 1973 | 0.16 | 0.08 | 0.03 | 0.13 | 0.13 | 0.71 |
| 1974 | -0.40 | -0.57 | 0.00 | 0.14 | 0.22 | 1.35 |
| 1975 | -0.37 | -0.51 | -0.01 | 0.12 | 0.36 | 2.39 |
| 1976 | 0.60 | 0.43 | 0.00 | 0.09 | 0.21 | 1.63 |
| 1977 | -0.15 | -0.19 | 0.00 | 0.07 | 0.27 | 2.04 |
| 1978 | 0.28 | 0.20 | 0.02 | 0.08 | 0.23 | 1.72 |
| 1979 | -0.09 | -0.13 | 0.00 | 0.07 | 0.24 | 2.03 |
| 1980 | -0.01 | -0.05 | 0.02 | 0.06 | 0.26 | 2.18 |
| 1981 | -0.05 | -0.09 | 0.01 | 0.06 | 0.27 | 2.44 |
| 1982 | -0.21 | -0.27 | 0.02 | 0.05 | 0.34 | 3.26 |
| 1983 | 0.24 | 0.19 | 0.01 | 0.06 | 0.30 | 2.77 |
| 1984 | -0.32 | -0.42 | 0.01 | 0.06 | 0.45 | 4.33 |
| 1985 | 0.11 | 0.08 | 0.00 | 0.05 | 0.38 | 4.11 |
| 1986 | 0.21 | 0.18 | 0.00 | 0.04 | 0.31 | 3.53 |
| 1987 | -0.08 | -0.11 | 0.02 | 0.03 | 0.29 | 3.96 |
| 1988 | 0.06 | 0.03 | 0.02 | 0.03 | 0.33 | 3.87 |
| 1989 | -0.06 | -0.06 | -0.03 | 0.03 | 0.35 | 4.27 |
| 1990 | 0.12 | 0.08 | 0.04 | 0.03 | 0.32 | 3.91 |
| 1991 | -0.23 | -0.32 | 0.09 | 0.03 | 0.42 | 5.20 |
| 1992 | 0.29 | 0.22 | 0.03 | 0.03 | 0.18 | 4.15 |
| 1993 | -0.07 | -0.01 | -0.09 | -0.01 | 0.08 | 4.41 |
| 1994 | -0.21 | -0.10 | -0.19 | -0.04 | 0.02 | 5.40 |
| 1995 | -0.21 | -0.23 | 0.02 | -0.05 | 0.01 | 6.53 |
| <i>Memorandum items:</i> | | | | | | |
| average 1971-1994 | -0.01 | -0.06 | 0.00 | 0.06 | 0.26 | 2.96 |
| average 1971-1980 | 0.01 | -0.08 | 0.01 | 0.09 | 0.22 | 1.55 |
| average 1981-1990 | 0.00 | -0.04 | 0.01 | 0.04 | 0.33 | 3.65 |
| average 1991-1995 | -0.09 | -0.05 | -0.04 | 0.00 | 0.18 | 4.79 |
| share of labor for 1971-1995 | 0.56 | ... | ... | ... | ... | ... |

Appendix Table 5. Kazakhstan: Computations of Total Factor Productivity for the Construction Sector, 1970 to 1995

| | NMP growth | TFP growth | Labor growth | Capital growth | Inv./ NMP | Cap./ NMP |
|------------------------------|---------------|---------------|-----------------|-------------------|--------------|--------------|
| 1970 | ... | ... | ... | ... | 0.14 | 0.63 |
| 1971 | 0.21 | 0.11 | 0.06 | 0.12 | 0.09 | 0.58 |
| 1972 | 0.03 | 0.04 | 0.02 | -0.04 | 0.08 | 0.54 |
| 1973 | 0.08 | 0.05 | 0.01 | 0.04 | 0.08 | 0.52 |
| 1974 | 0.13 | 0.08 | 0.03 | 0.04 | 0.08 | 0.48 |
| 1975 | 0.02 | -0.01 | 0.03 | 0.04 | 0.08 | 0.49 |
| 1976 | -0.01 | -0.03 | -0.01 | 0.05 | 0.07 | 0.52 |
| 1977 | 0.00 | -0.03 | 0.02 | 0.05 | 0.07 | 0.54 |
| 1978 | 0.10 | 0.07 | 0.02 | 0.05 | 0.07 | 0.52 |
| 1979 | 0.00 | -0.04 | 0.02 | 0.06 | 0.06 | 0.55 |
| 1980 | 0.04 | 0.02 | 0.01 | 0.03 | 0.08 | 0.55 |
| 1981 | 0.01 | -0.01 | 0.00 | 0.03 | 0.07 | 0.56 |
| 1982 | 0.00 | -0.03 | 0.00 | 0.06 | 0.07 | 0.60 |
| 1983 | 0.07 | 0.03 | 0.00 | 0.08 | 0.07 | 0.60 |
| 1984 | -0.02 | -0.06 | 0.04 | 0.05 | 0.07 | 0.64 |
| 1985 | -0.01 | -0.04 | 0.01 | 0.05 | 0.08 | 0.68 |
| 1986 | -0.08 | -0.11 | 0.02 | 0.04 | 0.09 | 0.76 |
| 1987 | 0.09 | 0.04 | 0.04 | 0.04 | 0.07 | 0.73 |
| 1988 | 0.10 | 0.05 | 0.05 | 0.03 | 0.08 | 0.69 |
| 1989 | 0.00 | -0.08 | 0.11 | 0.04 | 0.07 | 0.72 |
| 1990 | -0.08 | -0.13 | 0.06 | 0.03 | 0.08 | 0.80 |
| 1991 | -0.02 | 0.04 | -0.12 | 0.03 | 0.03 | 0.84 |
| 1992 | -0.43 | -0.53 | -0.02 | -0.03 | 0.02 | 1.42 |
| 1993 | -0.19 | -0.05 | -0.21 | -0.06 | 0.01 | 1.64 |
| 1994 | -0.18 | -0.04 | -0.22 | -0.07 | 0.00 | 1.87 |
| 1995 | -0.21 | -0.05 | -0.24 | -0.07 | 0.00 | 2.18 |
| <i>Memorandum items:</i> | | | | | | |
| average 1971-1994 | -0.01 | -0.03 | 0.00 | 0.03 | 0.07 | 0.74 |
| average 1971-1980 | 0.06 | 0.03 | 0.02 | 0.04 | 0.08 | 0.53 |
| average 1981-1990 | 0.01 | -0.03 | 0.03 | 0.04 | 0.08 | 0.68 |
| average 1991-1995 | -0.20 | -0.15 | -0.14 | -0.03 | 0.01 | 1.44 |
| share of labor for 1971-1995 | 0.53 | ... | ... | ... | ... | ... |

Appendix Table 6. Kazakhstan: Computations of Total Factor Productivity for the Industrial Sector, 1970 to 1995

(In percent)

| | NMP growth | TFP growth | Labor growth | Capital growth | Inv./ NMP | Cap./ NMP |
|------------------------------|---------------|---------------|-----------------|-------------------|--------------|--------------|
| 1970 | ... | ... | ... | ... | 0.53 | 3.08 |
| 1971 | 0.16 | 0.07 | 0.02 | 0.16 | 0.50 | 3.07 |
| 1972 | 0.07 | 0.00 | 0.02 | 0.14 | 0.47 | 3.28 |
| 1973 | 0.09 | 0.02 | 0.01 | 0.12 | 0.50 | 3.38 |
| 1974 | 0.11 | 0.04 | 0.02 | 0.13 | 0.39 | 3.45 |
| 1975 | 0.04 | -0.02 | 0.02 | 0.10 | 0.42 | 3.66 |
| 1976 | 0.01 | -0.05 | 0.03 | 0.10 | 0.35 | 3.98 |
| 1977 | 0.01 | -0.04 | 0.03 | 0.07 | 0.36 | 4.23 |
| 1978 | 0.03 | -0.01 | 0.02 | 0.06 | 0.37 | 4.38 |
| 1979 | -0.03 | -0.07 | 0.03 | 0.07 | 0.37 | 4.81 |
| 1980 | 0.05 | 0.01 | 0.02 | 0.06 | 0.45 | 4.88 |
| 1981 | 0.01 | -0.03 | 0.02 | 0.07 | 0.42 | 5.18 |
| 1982 | 0.05 | 0.01 | 0.02 | 0.07 | 0.40 | 5.25 |
| 1983 | -0.03 | -0.06 | 0.02 | 0.06 | 0.44 | 5.72 |
| 1984 | 0.07 | 0.04 | 0.00 | 0.06 | 0.41 | 5.67 |
| 1985 | -0.01 | -0.05 | 0.01 | 0.06 | 0.48 | 6.09 |
| 1986 | -0.07 | -0.11 | 0.01 | 0.06 | 0.43 | 6.97 |
| 1987 | -0.01 | -0.02 | 0.01 | 0.03 | 0.49 | 7.24 |
| 1988 | -0.02 | -0.05 | 0.01 | 0.04 | 0.51 | 7.72 |
| 1989 | -0.02 | -0.04 | 0.00 | 0.05 | 0.58 | 8.29 |
| 1990 1/ | -0.05 | -0.07 | -0.02 | 0.05 | 0.48 | 8.46 |
| 1991 | 0.00 | -0.02 | 0.01 | 0.04 | 0.34 | 8.76 |
| 1992 | -0.17 | -0.18 | -0.04 | 0.02 | 0.17 | 10.80 |
| 1993 | -0.14 | -0.07 | -0.13 | 0.00 | 0.14 | 12.55 |
| 1994 | -0.28 | -0.27 | -0.08 | -0.01 | 0.24 | 17.21 |
| 1995 | -0.08 | -0.03 | -0.09 | 0.00 | 0.15 | 18.62 |
| <i>Memorandum items:</i> | | | | | | |
| average 1971-1994 | -0.01 | -0.04 | 0.00 | 0.07 | 0.39 | 6.95 |
| average 1971-1980 | 0.05 | -0.01 | 0.02 | 0.10 | 0.42 | 3.91 |
| average 1981-1990 | -0.01 | -0.04 | 0.01 | 0.06 | 0.46 | 6.66 |
| average 1991-1995 | -0.13 | -0.11 | -0.07 | 0.01 | 0.21 | 13.59 |
| share of labor for 1971-1995 | 0.54 | ... | ... | ... | ... | ... |

1/ Based upon a revision of the official numbers.

Appendix Table 7. Kazakhstan: Computations of Total Factor Productivity for the Transport and Communications Sectors, 1970 to 1995

| | NMP growth | TFP growth | Labor growth | Capital growth | Inv./ NMP | Cap./ NMP |
|------------------------------|---------------|---------------|-----------------|-------------------|--------------|--------------|
| 1970 | ... | ... | ... | ... | 0.69 | 6.21 |
| 1971 | 0.11 | 0.05 | 0.03 | 0.11 | 0.59 | 6.21 |
| 1972 | 0.05 | 0.00 | 0.03 | 0.08 | 0.57 | 6.39 |
| 1973 | 0.13 | 0.07 | 0.04 | 0.09 | 0.55 | 6.17 |
| 1974 | 0.02 | -0.03 | 0.04 | 0.09 | 0.54 | 6.57 |
| 1975 | 0.05 | 0.01 | 0.03 | 0.08 | 0.54 | 6.74 |
| 1976 | 0.01 | -0.04 | 0.03 | 0.07 | 0.57 | 7.18 |
| 1977 | -0.02 | -0.06 | 0.03 | 0.06 | 0.60 | 7.73 |
| 1978 | 0.10 | 0.07 | 0.01 | 0.07 | 0.57 | 7.48 |
| 1979 | -0.03 | -0.06 | 0.03 | 0.06 | 0.54 | 8.18 |
| 1980 | 0.14 | 0.10 | 0.02 | 0.05 | 0.49 | 7.59 |
| 1981 | 0.03 | 0.00 | 0.02 | 0.05 | 0.45 | 7.72 |
| 1982 | -0.02 | -0.04 | 0.00 | 0.05 | 0.46 | 8.25 |
| 1983 | 0.07 | 0.05 | 0.01 | 0.04 | 0.47 | 8.08 |
| 1984 | 0.00 | -0.02 | 0.01 | 0.05 | 0.46 | 8.48 |
| 1985 | 0.07 | 0.04 | 0.01 | 0.04 | 0.45 | 8.29 |
| 1986 | 0.00 | -0.01 | 0.00 | 0.04 | 0.44 | 8.60 |
| 1987 | 0.05 | 0.04 | 0.00 | 0.03 | 0.39 | 8.41 |
| 1988 | 0.04 | 0.03 | 0.00 | 0.03 | 0.42 | 8.37 |
| 1989 | 0.04 | 0.04 | -0.02 | 0.04 | 0.47 | 8.37 |
| 1990 | -0.02 | 0.04 | -0.09 | 0.04 | 0.46 | 8.87 |
| 1991 | -0.06 | -0.03 | -0.06 | 0.04 | 0.23 | 9.77 |
| 1992 | -0.19 | -0.20 | -0.01 | 0.01 | 0.07 | 12.14 |
| 1993 | -0.14 | -0.11 | -0.06 | -0.01 | 0.07 | 14.06 |
| 1994 | -0.26 | -0.27 | -0.03 | -0.01 | 0.14 | 18.80 |
| 1995 | -0.14 | -0.10 | -0.06 | -0.01 | 0.12 | 21.70 |
| <i>Memorandum items:</i> | | | | | | |
| average 1971-1994 | 0.00 | -0.02 | 0.01 | 0.05 | 0.43 | 9.21 |
| average 1971-1980 | 0.06 | 0.01 | 0.03 | 0.08 | 0.56 | 7.03 |
| average 1981-1990 | 0.03 | 0.00 | 0.03 | 0.04 | 0.45 | 8.34 |
| average 1991-1995 | -0.16 | -0.13 | -0.05 | 0.01 | 0.12 | 15.29 |
| share of labor for 1971-1995 | 0.69 | ... | ... | ... | ... | ... |

Appendix Table 8. Kazakhstan: Computations of Total Factor Productivity for the Trade and Procurement Sectors, 1970 to 1995

| | NMP growth | TFP growth | Labor growth | Capital growth | Inv./ NMP | Cap./ NMP |
|------------------------------|---------------|---------------|-----------------|-------------------|--------------|--------------|
| 1970 | ... | ... | ... | ... | 0.12 | 1.57 |
| 1971 | 0.10 | 0.12 | 0.03 | -0.06 | 0.11 | 1.34 |
| 1972 | 0.06 | 0.00 | 0.04 | 0.08 | 0.10 | 1.37 |
| 1973 | 0.05 | -0.01 | 0.03 | 0.07 | 0.11 | 1.40 |
| 1974 | 0.06 | 0.00 | 0.03 | 0.08 | 0.10 | 1.43 |
| 1975 | 0.05 | -0.01 | 0.06 | 0.07 | 0.10 | 1.46 |
| 1976 | 0.02 | -0.03 | 0.03 | 0.06 | 0.10 | 1.51 |
| 1977 | 0.04 | 0.00 | 0.02 | 0.07 | 0.10 | 1.55 |
| 1978 | 0.05 | 0.00 | 0.03 | 0.07 | 0.10 | 1.57 |
| 1979 | 0.02 | -0.02 | 0.04 | 0.04 | 0.10 | 1.60 |
| 1980 | 0.04 | -0.01 | 0.04 | 0.06 | 0.10 | 1.63 |
| 1981 | 0.04 | 0.00 | 0.03 | 0.05 | 0.08 | 1.65 |
| 1982 | -0.04 | -0.07 | 0.03 | 0.04 | 0.09 | 1.79 |
| 1983 | 0.05 | 0.03 | 0.02 | 0.04 | 0.09 | 1.75 |
| 1984 | 0.03 | 0.01 | 0.01 | 0.04 | 0.09 | 1.77 |
| 1985 | 0.16 | 0.13 | 0.01 | 0.04 | 0.07 | 1.58 |
| 1986 | -0.04 | -0.06 | 0.00 | 0.04 | 0.07 | 1.70 |
| 1987 | 0.01 | 0.04 | -0.03 | -0.02 | 0.06 | 1.64 |
| 1988 | -0.04 | -0.02 | -0.05 | 0.02 | 0.07 | 1.73 |
| 1989 | 0.03 | 0.07 | -0.09 | 0.02 | 0.07 | 1.71 |
| 1990 | 0.01 | -0.05 | 0.10 | 0.02 | 0.07 | 1.73 |
| 1991 | -0.01 | -0.04 | 0.03 | 0.02 | 0.08 | 1.79 |
| 1992 | -0.14 | -0.14 | -0.05 | 0.03 | 0.01 | 2.15 |
| 1993 | -0.11 | -0.04 | -0.12 | -0.01 | 0.00 | 2.38 |
| 1994 1/ | -0.18 | -0.16 | -0.06 | -0.02 | 0.00 | 2.86 |
| 1995 1/ | -0.02 | 0.11 | -0.23 | -0.02 | 0.00 | 2.86 |
| <i>Memorandum items:</i> | | | | | | |
| average 1971-1994 | 0.01 | -0.01 | 0.00 | 0.03 | 0.08 | 1.76 |
| average 1971-1980 | 0.05 | 0.00 | 0.04 | 0.05 | 0.10 | 1.48 |
| average 1981-1990 | 0.02 | 0.01 | 0.00 | 0.03 | 0.08 | 1.70 |
| average 1991-1995 | -0.09 | -0.06 | -0.09 | 0.00 | 0.02 | 2.41 |
| share of labor for 1971-1995 | 0.48 | ... | ... | ... | ... | ... |

1/ Based upon employment in state enterprises and privatized former state enterprises.

Appendix Table 9. Kazakhstan: Interstate Deliveries for Selected Commodities, 1991-95 1/
(1990=100)

| | 1991 | | 1992 | | 1993 | | 1994 | | 1995 | |
|-------------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| | Import | Export | Import | Export | Import | Export | Import | Export | Import | Export |
| Industrial commodities | | | | | | | | | | |
| Coke | 81.6 | 26.9 | 69.6 | 30.5 | 28.1 | 7.0 | 21.3 | 0.0 | 54.3 | 71.6 |
| Rolled iron | 67.9 | 75.7 | 55.8 | 60.7 | 35.5 | 32.5 | 16.2 | 21.4 | 1.4 | 10.5 |
| Sulphuric acid | 92.4 | 80.0 | 28.2 | 88.5 | 4.0 | 50.7 | 1.4 | 17.9 | na | 20.2 |
| Soda ash | 341.8 | ... | 288.0 | ... | 151.9 | ... | 94.4 | ... | na | na |
| Caustic soda | 26.6 | 46.6 | 18.1 | 13.4 | 12.5 | 1.1 | 23.6 | 0.0 | na | na |
| Fertilizers | 79.0 | 97.3 | 99.6 | 28.2 | 31.6 | 5.4 | 29.8 | 1.5 | na | 2.4 |
| Tires | 76.8 | 103.1 | 68.0 | 59.6 | 38.0 | 28.3 | 22.7 | 6.4 | 18.1 | 0.0 |
| Wood pulp | 55.6 | ... | na | na | 12.2 | ... | 14.4 | ... | na | na |
| Paper | 146.4 | ... | 104.5 | ... | 40.0 | ... | 42.2 | ... | na | na |
| Cement | 111.1 | 94.4 | 134.1 | 43.7 | 82.2 | 17.5 | 184.3 | 24.1 | na | 33.3 |
| Glass | 73.8 | ... | 2.8 | ... | 59.3 | ... | 26.0 | ... | na | na |
| Linoleum | 65.2 | 95.3 | 78.5 | 388.2 | 97.4 | 301.2 | 50.7 | 98.8 | na | na |
| Asbestos cement | 36.2 | 63.5 | 30.7 | 91.6 | 50.8 | 84.8 | 14.6 | 32.4 | na | 27.3 |
| Electricity 2/ | 90.2 | ... | 81.7 | ... | 67.5 | ... | 75.2 | ... | 39.2 | ... |
| Coal | 45.9 | 91.7 | 35.2 | 79.8 | 39.2 | 62.8 | 3.4 | 41.8 | 9.6 | 24.1 |
| Natural gas | 79.8 | 101.6 | 125.3 | 95.5 | 91.5 | 84.2 | 62.9 | 39.9 | 80.0 | 62.6 |
| Petroleum | 66.1 | 99.2 | 62.2 | 69.0 | 45.7 | 58.8 | 9.9 | 33.0 | 3.6 | 29.0 |
| Gasoline | 88.7 | 70.0 | 54.1 | 41.4 | 44.1 | 21.9 | 1.1 | 7.4 | 9.3 | 10.4 |
| Diesel | 90.3 | 64.7 | 59.2 | 31.4 | 36.7 | 17.5 | 4.9 | 2.9 | 30.2 | 5.0 |
| Fuel oil | 96.3 | 101.3 | 65.2 | 48.8 | 22.9 | 3.7 | 9.3 | 3.9 | 8.7 | 7.0 |
| Cotton fibre 3/ | na | na | 73.6 | 69.0 | 34.7 | 62.1 | 2.1 | 4.9 | na | 14.4 |
| Natural wool 3/ | na | na | 45.0 | 41.7 | 9.3 | 38.3 | 5.3 | 9.2 | na | na |
| Lorries | 101.0 | ... | 62.2 | ... | 56.5 | ... | 6.7 | ... | 9.8 | na |
| Passenger cars | 85.9 | ... | 32.0 | ... | 26.1 | ... | 7.6 | ... | 23.4 | na |
| Buses | 79.3 | ... | 41.9 | ... | 76.0 | na | 19.3 | na | na | na |
| Tractors | 65.2 | 77.0 | 80.2 | 22.6 | 39.7 | 7.7 | 1.6 | 5.9 | na | 6.4 |
| Bulldozers | 38.1 | 66.9 | 47.6 | 19.3 | 70.9 | 5.1 | 7.5 | 1.9 | na | na |
| Freight cars | 49.7 | ... | 19.6 | ... | 27.7 | ... | 6.1 | ... | na | na |
| Metal cutters | 88.5 | 132.9 | 55.9 | 55.1 | 24.6 | 28.5 | 8.8 | 11.0 | na | na |
| Forging machines | 73.1 | 87.9 | 41.1 | 37.1 | 14.6 | 22.1 | 1.2 | 1.9 | na | na |
| Grain harvesters | 87.5 | ... | 113.4 | ... | 53.4 | ... | 0.1 | ... | na | na |
| Forage harvesters | 44.1 | ... | 69.7 | ... | 28.4 | na | 9.0 | ... | na | na |

Appendix Table 9 (concluded)

| | 1991 | | 1992 | | 1993 | | 1994 | | 1995 | |
|---------------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| | Import | Export | Import | Export | Import | Export | Import | Export | Import | Export |
| Agricultural commodities | | | | | | | | | | |
| Grain | 300.0 | 22.1 | 127.0 | 110.0 | 15.9 | 51.0 | 0.5 | 47.4 | 0.9 | 51.9 |
| Meat | 7.3 | 76.6 | 7.6 | 32.0 | 16.1 | 35.6 | 7.2 | 12.1 | na | na |
| Milk | 74.1 | 2.9 | 181.9 | 45.9 | 7.7 | 67.8 | 6.5 | 18.2 | na | na |
| Eggs | 31.0 | 104.1 | 23.4 | 70.7 | 5.5 | 45.9 | 18.3 | 16.5 | na | na |
| Groats | 105.8 | 66.7 | 40.8 | 57.7 | 0.3 | 37.7 | 2.7 | 20.5 | na | na |
| Sugar | 63.7 | 53.6 | 7.1 | 0.8 | 21.1 | 44.4 | 14.8 | 117.0 | 0.1 | na |
| Fish | 73.6 | 154.3 | 39.1 | 147.7 | 5.5 | 140.3 | 1.6 | 93.2 | na | na |
| Canned fish | 39.9 | 1021.3 | 19.2 | 475.9 | 1.3 | 683.7 | 4.7 | 577.0 | na | na |
| Vegetable oil | 34.4 | 45.4 | 11.1 | 14.0 | 6.0 | 3.3 | 13.5 | 0.8 | 23.2 | na |
| Canned vegetables | 83.8 | ... | 13.2 | na | 31.7 | na | 15.6 | na | na | na |
| Canned fruits | 40.5 | ... | 19.5 | ... | 25.2 | na | 13.1 | na | na | na |
| Potatoes | 116.4 | 2357.5 | 9.4 | 2716.5 | 21.6 | 1028.5 | 3.9 | 421.0 | na | na |
| Vegetables | 80.9 | 33.1 | 39.1 | 71.2 | 16.4 | 18.9 | 3.5 | 7.9 | na | na |
| Fruits 3/ | na | na | 24.7 | 55.7 | 31.7 | 41.0 | 17.9 | 1.2 | na | na |
| Consumer goods | | | | | | | | | | |
| Cotton fabrics | 59.0 | 25.7 | 36.1 | 33.7 | 12.1 | 37.8 | 2.0 | 48.8 | na | na |
| Woolen fabrics 3/ | na | na | 82.2 | 3.8 | 59.1 | 88.1 | 10.1 | 33.9 | na | na |
| Silk fabrics 3/ | na | na | 46.6 | 11.8 | 36.1 | 14.0 | 7.9 | 2.6 | na | na |
| Footwear 3/ | na | na | 38.8 | 64.3 | 5.4 | 83.2 | 1.0 | 79.1 | 5.8 | na |
| Carpets 3/ | na | na | na | na | 70.9 | ... | 40.8 | na | na | na |
| Refrigerators | 84.1 | ... | 34.2 | ... | 33.8 | na | 8.2 | ... | 16.7 | na |
| Washing machines 3/ | na | na | 46.3 | 53.1 | 31.1 | 318.0 | 9.3 | 198.3 | na | na |
| Televisions | 55.7 | ... | 25.3 | ... | 25.0 | na | 5.7 | ... | 8.1 | na |
| Radios 3/ | na | na | 73.7 | 107.5 | 39.2 | 51.8 | 50.8 | 7.5 | na | na |
| Bicycles 3/ | na | na | 26.1 | ... | 9.9 | na | 4.6 | na | 13.2 | na |

1/ The symbol "na" indicates no data available, while "..." is used when the index is undefined (no exports or imports in 1990 or 1991).

2/ Net imports.

3/1991 = 100 as base year.

Appendix Table 10. Kazakhstan: Energy Balances, 1980-1995
(In natural units)

| | 1980 | 1985 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 |
|--|-------|-------|-------|-------|-------|-------|-------|-------|
| Oil 1/ | | | | | | | | |
| Production | 18.7 | 22.8 | 25.8 | 26.6 | 25.8 | 23.0 | 20.3 | 20.6 |
| Export | 14.3 | 19.2 | 21.8 | 22.6 | 20.3 | 17.9 | 9.8 | 9.5 |
| Import | 7.0 | 10.3 | 13.4 | 14.0 | 11.5 | 8.5 | 4.7 | 2.5 |
| Balance | 11.4 | 13.9 | 17.4 | 18.0 | 17.0 | 13.6 | 15.2 | 13.6 |
| Oil products 1/ | | | | | | | | |
| Production | 11.4 | 13.9 | 17.9 | 18.0 | 16.9 | 14.8 | 11.8 | 10.9 |
| Export | ... | 0.1 | 5.2 | 5.2 | 2.2 | 1.8 | 1.5 | 1.3 |
| Import | ... | 5.0 | 8.1 | 6.8 | 4.3 | 2.5 | 1.4 | 1.7 |
| Balance | 17.5 | 18.8 | 20.8 | 19.6 | 19.0 | 15.5 | 11.7 | 11.3 |
| Consumption | ... | ... | ... | 16.5 | 15.4 | 13.5 | 10.3 | 8.5 |
| of which in industry 2/ | ... | ... | ... | ... | ... | 42.2 | 48.5 | 52.9 |
| Coal 3/ | | | | | | | | |
| Production | 115.4 | 130.8 | 131.4 | 130.4 | 126.5 | 111.9 | 104.4 | 83.2 |
| Export | 45.8 | 47.8 | 54.3 | 49.9 | 43.6 | 34.5 | 22.8 | 19.9 |
| Import | 11.8 | 13.9 | 13.3 | 5.6 | 4.3 | 2.5 | 0.4 | 1.2 |
| Balance | 81.3 | 96.9 | 90.4 | 86.1 | 87.2 | 79.9 | 82.0 | 64.4 |
| Consumption | ... | ... | ... | 77.3 | 78.2 | 73.7 | 64.7 | 61.0 |
| of which in industry 2/ | ... | ... | ... | ... | ... | 85.9 | 84.9 | 86.9 |
| Gas 3/ | | | | | | | | |
| Production | 4.3 | 5.5 | 7.1 | 7.9 | 8.1 | 6.7 | 4.5 | 5.9 |
| Export | 4.1 | 2.2 | 4.1 | 4.2 | 3.9 | 3.5 | 1.6 | 2.6 |
| Import | 9.9 | 6 | 11.4 | 9.1 | 14.3 | 10.6 | 7.2 | 9.1 |
| Balance | 10.1 | 9.3 | 14.4 | 12.8 | 18.5 | 13.8 | 10.1 | 12.4 |
| Consumption | 8.3 | 10.5 | 13.7 | 10.8 | 11.9 | 9.9 | 7.8 | 7.5 |
| of which in industry 2/ | 66.1 | 61.0 | 54.7 | 53.7 | 48.7 | 82.8 | 70.5 | 76.0 |
| Electricity 4/ | | | | | | | | |
| Production | 61.5 | 81.3 | 87.4 | 86.0 | 82.7 | 77.4 | 66.4 | 66.7 |
| Export | 10.2 | 11.5 | 14.1 | 15.2 | 15.4 | 15.3 | 14.0 | ... |
| Import | 20.7 | 22.1 | 31.4 | 30.8 | 29.6 | 27.0 | 27.0 | ... |
| Consumption | 72.1 | 91.8 | 104.7 | 101.6 | 96.9 | 89.2 | 79.4 | 73.5 |
| of which in industry 2/ | 62.1 | 59.9 | 58.9 | 57.2 | 54.4 | 50.4 | 45.8 | 48.4 |
| Heat 5/ | | | | | | | | |
| Consumption | 95.2 | 115.4 | 116.0 | 106.2 | 113.0 | 100.7 | 81.7 | 71.0 |
| of which in industry 2/ | 47.4 | 48.8 | 51.5 | 55.6 | 62.7 | 57.8 | 57.5 | 57.7 |
| <i>Memorandum item:</i> | | | | | | | | |
| ratio of output to available energy resources (1990=100) | | | | | | | | |
| Oil products | 89.0 | 93.7 | 100.0 | 102.6 | 103.2 | 93.1 | 85.7 | 90.8 |
| Coal | 95.2 | 111.1 | 100.0 | 103.7 | 109.0 | 110.4 | 138.2 | 119.1 |
| Gas | 74.0 | 66.9 | 100.0 | 96.8 | 145.2 | 119.8 | 106.9 | 144.0 |

1/ In million tons.

2/ In percent.

3/ In billion cubic meter.

4/ In billion KWh.

5/ In million Kcal.

Appendix Table 11. Kazakhstan: Turnover of Workers in Basic Sectors, 1992-95
(In percent of employment)

| | 1992 | | 1993 | | 1994 | | 1995 | | | |
|---|-------------|-------------|------------|-------------|-------------|------------|-------------|-------------|-------------|-------------|
| | Arriving | Leaving | Difference | Arriving | Leaving | Difference | Arriving | Leaving | | |
| Total | 18.2 | 24.0 | 5.7 | 18.5 | 23.6 | 5.1 | 17.8 | 23.4 | 35.5 | 12.1 |
| Industry | 17.2 | 20.1 | 3.0 | 23.7 | 29.1 | 5.5 | 21.6 | 31.3 | 32.0 | 10.1 |
| Agriculture and forestry | .. | .. | .. | 9.1 | 10.9 | 1.8 | 9.4 | 15.5 | 5.4 | 9.8 |
| Construction | 24.8 | 30.2 | 5.3 | 30.3 | 38.6 | 8.2 | 27.7 | 46.3 | 31.6 | 48.5 |
| Transport and communication | 14.5 | 21.8 | 7.3 | 14.6 | 30.0 | 15.4 | 15.0 | 27.1 | 13.6 | 30.2 |
| Trade and procurement | 16.4 | 29.0 | 12.6 | 26.6 | 36.2 | 9.6 | 27.3 | 43.2 | 37.2 | 24.3 |
| Public health, physical education and social security | .. | .. | .. | 18.1 | 16.1 | -2.0 | 21.8 | 24.9 | 19.5 | 21.5 |
| Culture and art | .. | .. | .. | 11.0 | 10.6 | -0.3 | 13.8 | 17.8 | 11.7 | 14.9 |
| Science and scientific services | .. | .. | .. | 25.2 | 31.4 | 6.2 | 23.2 | 27.4 | 19.5 | 26.8 |
| Lending, finance, insurance etc. | .. | .. | .. | 17.1 | 12.9 | -4.2 | 21.2 | 27.8 | 19.6 | 26.0 |
| Education | .. | .. | .. | .. | .. | .. | 12.1 | 13.4 | 12.6 | -0.2 |

Appendix Table 12. Kazakhstan: Sectoral Investment Shares, 1990-1995
(In percent)

| | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 |
|-------------------------------------|------|------|------|------|------|------|
| Shares in current prices 1/ | | | | | | |
| Industry | 31.2 | 30.0 | 33.7 | 38.9 | 55.2 | 57.1 |
| Agriculture | 22.5 | 27.6 | 27.7 | 18.8 | 6.0 | 3.6 |
| Construction | 5.2 | 3.6 | 1.8 | 1.1 | 0.7 | 0.8 |
| Transport and comm. | 9.5 | 5.3 | 3.7 | 5.3 | 9.5 | 12.1 |
| Trade and procurement | 1.7 | 1.8 | 0.9 | 0.8 | 0.8 | 0.5 |
| Other | 30.0 | 31.7 | 32.2 | 35.1 | 27.9 | 25.8 |
| Shares in current prices 2/ | | | | | | |
| Industry | 30.5 | 29.2 | 23.4 | 32.5 | 54.0 | 57.1 |
| Agriculture | 24.0 | 30.2 | 43.8 | 28.4 | 10.7 | 5.1 |
| Construction | 2.9 | 2.1 | 1.4 | 1.2 | 0.9 | 0.7 |
| Transport and comm. | 11.0 | 6.2 | 3.8 | 4.0 | 9.4 | 13.3 |
| Trade and procurement | 2.0 | 2.5 | 1.1 | 1.1 | 1.2 | 0.5 |
| Other | 29.6 | 29.8 | 26.4 | 32.8 | 23.8 | 23.3 |
| Shares in constant prices 1/ | | | | | | |
| Industry | 31.4 | 30.1 | 33.6 | 39.1 | 54.9 | 57.1 |
| Agriculture | 24.2 | 29.3 | 29.8 | 20.3 | 5.6 | 3.6 |
| Construction | 4.6 | 3.4 | 1.8 | 1.1 | 0.7 | 0.8 |
| Transport and comm. | 9.6 | 5.3 | 3.7 | 5.4 | 9.5 | 12.1 |
| Trade and procurement | 2.2 | 2.9 | 0.9 | 0.4 | 0.4 | 0.5 |
| Other | 27.8 | 29.0 | 30.2 | 33.6 | 29.0 | 25.8 |

1/ Based on resources spent on investment.

2/ Based on commissioned assets.

Appendix Table 13. Kazakhstan: Sectoral Investment Shares in Industry, 1990-1995
(In percent and for investment in current prices)

| | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 |
|---------------------------------|------|------|------|------|------|------|
| Electric power generation | 10.4 | 10.6 | 12.3 | 22.6 | 12.9 | 14.4 |
| Other energy | 42.0 | 41.8 | 45.3 | 41.2 | 60.1 | 50.7 |
| Oil industry | 22.4 | 25.9 | 23.2 | 26.3 | 48.8 | 39.6 |
| Gas industry | 10.8 | 5.6 | 12.3 | 2.3 | 2.3 | 3.3 |
| Coal industry | 8.7 | 10.4 | 9.8 | 12.5 | 9.1 | 7.8 |
| Ferrous metallurgy | 4.5 | 5.1 | 8.2 | 9.5 | 7.3 | 9.9 |
| Nonferrous metallurgy | 9.9 | 11.8 | 15.7 | 15.2 | 9.5 | 16.8 |
| Chemical industry | 7.0 | 6.2 | 4.1 | 3.2 | 2.4 | 1.3 |
| Machine building | 9.3 | 5.4 | 2.5 | 3.3 | 1.0 | 1.1 |
| Timber and paper industry | 0.6 | 1.0 | 0.3 | 0.1 | 0.2 | 0.2 |
| Construction materials industry | 3.7 | 3.9 | 1.8 | 0.5 | 1.0 | 0.6 |
| Light industry | 3.7 | 2.7 | 2.2 | 0.5 | 0.6 | 0.1 |
| Food industry | 5.1 | 7.4 | 4.6 | 2.6 | 3.1 | 2.8 |
| Other industry | 3.8 | 4.1 | 2.9 | 1.3 | 1.8 | 2.0 |

Appendix Table 14. Kazakhstan: Profitability of Enterprises in Real Terms, 1993-1995
(1992=100)

| | 1993 | | | | 1994 | | | | 1995 | | | |
|--------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| | Mar. | Jun. | Sep. | Dec. | Mar. | Jun. | Sep. | Dec. | Mar. | Jun. | Sep. | Dec. |
| Total | 73.9 | 76.0 | 53.0 | 30.1 | 20.0 | 20.9 | 22.2 | 19.6 | 16.5 | 15.7 | 14.2 | 10.4 |
| Industry | 81.2 | 87.0 | 56.7 | 34.5 | 25.9 | 26.1 | 24.9 | 23.6 | 19.8 | 18.3 | 16.8 | 13.2 |
| Transport | 58.5 | 115.9 | 136.8 | 51.5 | -81.2 | -96.1 | 43.5 | 50.7 | 48.9 | 58.1 | 40.9 | 52.5 |
| Communication | 85.8 | 88.1 | 48.1 | 16.9 | 50.9 | 89.4 | 47.8 | 43.1 | 46.3 | 62.6 | 59.2 | 67.3 |
| Construction | 80.4 | 111.2 | 93.8 | 60.0 | 39.7 | 62.6 | 62.4 | 56.0 | 46.3 | 44.5 | 38.9 | 31.5 |
| Geology | 99.7 | 154.4 | 72.1 | 76.1 | 42.9 | 43.6 | 47.1 | 43.3 | 32.1 | 28.0 | 28.9 | 18.6 |
| Procurement | 48.9 | 42.3 | 22.4 | -3.0 | -24.1 | -10.4 | -7.8 | -14.6 | -9.8 | -10.3 | -7.9 | -5.5 |
| Supply and sales | 52.5 | 39.6 | 65.4 | 44.6 | 34.4 | 30.4 | 11.8 | 17.5 | 10.8 | 8.2 | 11.0 | 6.4 |
| Trade | 61.6 | 169.9 | 260.8 | 509.0 | 299.8 | 177.7 | 1.4 | -100.5 | -163.1 | -158.8 | -119.5 | -82.7 |
| Everyday services | 77.1 | 176.4 | 163.0 | 124.3 | 3.0 | 52.9 | 44.3 | -103.3 | -111.2 | -113.0 | -106.2 | -56.0 |
| Municipal services | 151.4 | 167.5 | 70.4 | 68.9 | 118.3 | 133.2 | 94.7 | 123.2 | 115.5 | 92.9 | 91.5 | 72.8 |
| Other | 82.4 | 73.1 | 88.7 | 44.1 | 35.9 | 26.7 | 28.6 | 17.9 | 5.3 | 3.7 | 2.0 | -0.1 |
| Agriculture | -- | -- | -- | -2.7 | -- | -- | -- | -7.5 | -- | -- | -- | -9.2 |

Appendix Table 15. Kazakhstan: Bank and Interenterprise Arrears in Real Terms, 1992-95

(Dec. 1991 = 100)

| | 1992 | | | 1993 | | | 1994 | | | 1995 | | | | | | |
|-------------------------|-------|-------|-------|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| | Mar. | Jun. | Dec. | Mar. | Jun. | Dec. | Mar. | Jun. | Dec. | Mar. | Jun. | Dec. | | | | |
| Arrears on bank loans | 39.0 | 59.8 | 128.6 | 270.1 | 1261.0 | 1101.6 | 1283.1 | 1719.7 | 1782.3 | 1496.4 | 1377.4 | 1283.9 | 1406.2 | 1262.3 | 1178.5 | 1007.5 |
| Interenterprise arrears | 190.5 | 156.2 | 44.2 | 32.2 | 32.6 | 40.8 | 71.2 | 85.3 | 28.0 | 55.5 | 105.2 | 167.4 | 200.7 | 214.2 | 217.3 | 246.6 |

Appendix Table 16. Kazakhstan: Outstanding Bank Loans, 1991-95

| | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 |
|---|--------------|--------------|---------------|--------------|--------------|--------------|
| In millions of national currency | | | | | | |
| Total | 25570 | 57095 | 987672 | 14564 | 44683 | 42985 |
| Short-term | 18573 | 50003 | 953422 | 13879 | 42733 | 38819 |
| Industry | 2809 | 14522 | 148825 | 1911 | 14320 | 9332 |
| Agriculture | 4310 | 8064 | 148263 | 2167 | 8261 | 1232 |
| Construction | 1642 | 1898 | 19998 | 176 | 607 | 946 |
| Transport and communication | 232 | 516 | 11074 | 1302 | 368 | 785 |
| Trade and procurement | 7274 | 12565 | 291331 | 2965 | 5605 | 2636 |
| Other | 2306 | 12468 | 333931 | 5358 | 13572 | 23883 |
| Long-term | 6997 | 7062 | 34250 | 685 | 1950 | 4166 |
| In real terms (1990=100) | | | | | | |
| Total | 100 | 90.3 | 51.0 | 16.6 | 4.0 | 2.4 |
| Short-term | 100 | 108.9 | 67.8 | 21.8 | 5.3 | 3.0 |
| Industry | 100 | 209.0 | 70.0 | 19.8 | 11.8 | 4.8 |
| Agriculture | 100 | 75.7 | 45.4 | 14.6 | 4.4 | 0.4 |
| Construction | 100 | 46.7 | 16.1 | 3.1 | 0.9 | 0.8 |
| Transport and communication | 100 | 90.1 | 63.2 | 163.7 | 3.7 | 4.9 |
| Trade and procurement | 100 | 69.8 | 52.9 | 11.9 | 1.8 | 0.5 |
| Other | 100 | 218.7 | 191.3 | 67.7 | 13.6 | 14.9 |
| Long-term | 100 | 40.8 | 6.5 | 2.9 | 0.6 | 0.9 |
| In percent of total loans | | | | | | |
| Short-term | 72.6 | 87.6 | 96.5 | 95.3 | 95.6 | 90.3 |
| Industry | 11.0 | 25.4 | 15.1 | 13.1 | 32.0 | 21.7 |
| Agriculture | 16.9 | 14.1 | 15.0 | 14.9 | 18.5 | 2.9 |
| Construction | 6.4 | 3.3 | 2.0 | 1.2 | 1.4 | 2.2 |
| Transport and communication | 0.9 | 0.9 | 1.1 | 8.9 | 0.8 | 1.8 |
| Trade and procurement | 28.4 | 22.0 | 29.5 | 20.4 | 12.5 | 6.1 |
| Other | 9.0 | 21.8 | 33.8 | 36.8 | 30.4 | 55.6 |
| Long-term | 27.4 | 12.4 | 3.5 | 4.7 | 4.4 | 9.7 |

Appendix Table 17. Kazakhstan: Evolution of the Consolidated Budget, 1992-95
(In percent of GDP at current prices)

| | 1992 | 1993 | 1994 | 1995 |
|------------------------------------|-------------|-------------|-------------|-------------|
| Current Operations | | | | |
| Current Revenues and Grants | 38.9 | 37.2 | 23.8 | 23.6 |
| Direct Taxes | 19.1 | 18.6 | 9.4 | 12.0 |
| Indirect Taxes | 15.4 | 10.6 | 7.3 | 4.8 |
| Non-Tax Revenues | 2.2 | 6.8 | 7.1 | 6.8 |
| Grants | 2.1 | 1.3 | 0.0 | 0.0 |
| Current Expenditures | 34.8 | 31.6 | 23.5 | 23.5 |
| Consumption | 18.1 | 19.2 | 12.2 | 14.5 |
| Interest Payments | 2.2 | 0.1 | 3.9 | 0.2 |
| Transfers to Households | 11.2 | 8.3 | 4.6 | 6.6 |
| Transfers to the Rest of the World | 0.4 | 0.0 | 0.3 | 0.0 |
| Subsidies | 2.9 | 4.0 | 2.4 | 2.3 |
| Capital Operations | | | | |
| Capital Revenues (Privatization) | 0.0 | 2.9 | 0.3 | 0.7 |
| Capital Expenditures | 11.4 | 9.2 | 7.2 | 2.0 |
| Net Lending and Participation | 4.7 | 5.6 | 4.3 | 1.1 |
| Public Sector Investment | 6.7 | 3.6 | 2.9 | 1.0 |
| Budget Deficit | -7.3 | -0.7 | -6.5 | -1.3 |

Source: World Bank

REFERENCES

- Allison, Ch., and Ringold, D., 1996, "Labor Markets in Transition in Central and Eastern Europe," World Bank Technical Paper No. 352.
- Belkindas, M., and Sagers, M., 1990, "A Preliminary Analysis of Economic Relations Among Union Republics of the USSR: 1970-1988," *Soviet Geography*, Vol.31, No.9 (November), pp. 629-656.
- Blanchard, O. and M. Kremer, 1997, "Disorganization," *The Quarterly Journal of Economics*, Vol. 112, No.4 (November), pp. 1091-1126.
- Boeri, T., 1997, "Labor Market Flows in the Midst of Structural Change," in S. Commander (ed.), *Enterprise Restructuring and Unemployment in Models of Transition* (Cambridge: Cambridge University Press, forthcoming).
- Brown, S., and Belkindas, M., 1993, "Who's Feeding Whom? An Analysis of Soviet Interrepublic Trade," in R. Kaufman and J. Hardt for the Joint Economic Committee, Congress of the United States, *The former Soviet Union in Transition* (Armonk, New York: M.E. Sharpe), pp. 163-183.
- Calvo, G.A., and Coricelli, F., 1993, "Output Collapse in Eastern Europe," *IMF Staff Papers*, Vol. 40, No.1 (March), pp. 32-52.
- Calvo, G.A., and Coricelli, F., 1996, "Credit Market Imperfections and Low-Output Equilibrium in Economies in Transition," in M.I. Blejer, Z. Eckstein, Z. Hercowitz, and L. Leiderman (eds.), *Financial Factors in Economic Stabilization and Growth*, (Cambridge: Cambridge University Press), pp. 75-102.
- Chadha, B., and Coricelli, F., 1994, "Fiscal Constraints and the Speed of Transition", CEPR Discussion Paper No. 993.
- Cheasty, A. and Davis, J.M., 1996, "Fiscal Transition in Countries of the Former Soviet Union: An Interim Assessment," *Mocst-Most*, Vol.6, No. 3, pp. 7-34.
- Chu, K. and Schwartz, G., 1994, "Output Decline and Government Expenditures in European Transition Economies," IMF Working Paper No. 94/68.
- Coricelli, F., 1996, "Fiscal Constraints, Reform Strategies, and the Speed of Transition: The Case of Central-Eastern Europe," Centre for Economic Policy Research Working Paper No. 1339.
- Davis, S., Haltiwanger J., and Schuh S., 1996, *Job Creation and Destruction*, (Cambridge, Massachusetts: MIT Press).

- Dikhanov, Y., 1990, "Measuring the Terms of Trade in the Countries of the Former Soviet Union," in M. Belkindas and O. Ivanova (eds.), *Foreign Trade Statistics in the USSR and Successor States*, The World Bank, Studies of Economies in Transformation No. 18, (November), pp. 55-73.
- Easterly, W., and Fischer, S., 1994, "The Soviet Economic Decline: Historical and Republican Data," World Bank Policy Research Working Paper No. 1284.
- Easterly, W., and Fischer, S., 1995, "The Soviet Economic Decline," *The World Bank Economic Review*, Vol. 9, No.3 (September), pp.341-371.
- Economist Intelligence Unit for the United Nations Industrial Development Organization, 1996, *The Central Asian Republics. Industrial Reform and Restructuring*, Volume I, Kazakhstan, Kyrgyz Republic, Tajikistan.
- Ghosh, R., 1996, "The Output-Inflation Nexus in Ukraine: Is There a Trade-Off?" IMF Working Paper 96/46.
- International Monetary Fund, 1992, *Kazakhstan: Economic Review*.
- International Monetary Fund, 1993, *Kazakhstan: Economic Review*, No.5.
- International Monetary Fund, 1994, *Kazakhstan: Economic Review*, No. 18.
- International Monetary Fund, 1996, "Kazakhstan," IMF Staff Country Report No. 96/22.
- International Monetary Fund, 1997, "Kazakhstan," IMF Staff Country Report No. 97/67.
- Jorgenson, D., Gollop, F., and Fraumeni, B., 1987, *Productivity and U.S. economic growth*, (Cambridge, MA: Harvard University Press).
- Kauffman, D., and Kaliberda, A., 1996, "Integrating the unofficial economy into the dynamics of post-socialist economies: a framework of analysis and evidence," World Bank Policy Research Working Paper No.1691.
- Kellogg, R.L., 1990, "Inflation in Soviet Investment and Capital Stock Data and its Impact on Measurement of Total Factor Productivity," in *Measuring Soviet GNP: Problems and Solutions*, a Conference Report, Central Intelligence Agency, Directorate of Intelligence.
- Kornai, J., 1994, "Transformational Recession: the Main Causes," *Journal of Comparative Economics*, Vol. 19, No.1 (August), pp. 39-63.

- Kulekeev, Z., 1997, "Shadow Economy in Kazakhstan," paper presented at the Economic Development Institute conference on "Understanding the Transition in Central Asia," Washington D.C., June 1997.
- Laski, K., 1994, "Fiscal Policy and Effective Demand During Transformation" in G. Hunya (ed.), *Economic Transformation in East-Central Europe and in the Newly Independent States* (Boulder, Colorado: Westview Press in cooperation with The Vienna Institute for Comparative Economic Studies), pp. 113-133.
- Lilien, D., 1982, "Sectoral Shifts and Cyclical Unemployment," *Journal of Political Economy* Vol. 90, No.4 (August), pp. 775-793.
- Michalopoulos, C., 1996, "Payments and Finance Problems in the Commonwealth of Independent States," World Bank Policy Research Working Paper No.1587.
- Mitsui, H., 1994, "Kazakhstan's Industrial Production: Structural Impediment toward Transition," International Development Center of Japan, Staff Occasional Notes No.6 (March).
- Mundell, R.A., 1997, "The Great Contractions in Transition Economies," in M. Blejer and M. Škreb (eds.), *Macroeconomic Stabilization in Transition Economies* (Cambridge: Cambridge University Press), pp. 73-99.
- Noren, J., and Kurtzweg, L., 1993, "The Soviet Economy Unravels: 1985-91," in R. Kaufman and J. Hardt for the Joint Economic Committee, Congress of the United States, *The Former Soviet Union in Transition* (Armonk, New York: M.E. Sharpe), pp. 8-33.
- OECD, *Agricultural Policies, Markets and Trade in Transition Economies. Monitoring and Evaluation* (Paris, OECD, yearly).
- Pitzer, J., and Baukol, A., 1991, "Recent GNP and Productivity Trends," *Soviet Economy*, Vol. 7, No.1 (January-March), pp. 46-82.
- PlanEcon, *Energy Outlook for Eastern Europe and the former Soviet Republics* (Washington D.C.: Planecon, yearly).
- PlanEcon, *Planecon Energy Report* (Washington D.C.: Planecon, quarterly).
- Roland, G., and Verdier, T., 1997, "Transition and the Output Fall, Centre for Economic Policy Research Working Paper No. 1636.
- Rosati, D., 1994, "Output Decline During Transition From Plan to Market: A Reconsideration," *Economics of Transition*, Vol. 2, No.4 (December), pp. 419-41.

- Rutkowski, J., 1996, "Changes in the Wage Structure during Economic Transition in Central and Eastern Europe," World Bank Technical Paper No. 340.
- Shapiro, M., 1987, "Are Cyclical Fluctuations in Productivity Due More to Supply Shocks or Demand Shocks?", *American Economic Review*, Vol. 77, No. 2 (May), pp. 118-124.
- Steinberg, D., 1990, *The Soviet Economy 1970-1990: A Statistical Analysis* (San Francisco, CA: International Trade Press).
- Tarr, D., 1993, "How Moving to World Prices Affects the Terms of Trade in 15 Countries of the Former Soviet Union," World Bank Policy Research Working Paper No. 1074.
- Tarr, D., 1994, "The Terms-of-Trade Effects of Moving to World Prices on Countries of the Former Soviet Union," *Journal of Comparative Economics*, Vol. 18, No.1 (February), pp.1-24.
- U.S. Department of Agriculture, *Former USSR: International Agriculture and Trade Report*, (Washington DC: U.S.D.A., yearly).
- U.S. Government Printing Office, 1990, *Measures of Soviet National Product in 1982 Prices*, study prepared for the use of the Joint Economic Committee, Congress of the United States.
- Vavilov, A., and Vjugin, O., 1993, "Trade Patterns After Integration Into the World Economy," in John Williamson (ed.), *Economic Consequences of Soviet Disintegration* (Washington D.C.: Institute for International Economics), pp. 99-174.
- Watson, R., 1994, "Interrepublic Trade in the Former Soviet Union: Structure and Implications," *Post-Soviet Geography*, Vol.35, No.7 (September), pp.371-408.
- Winiiecki, J., 1991, "The Inevitability of a Fall in Output in the Early Stages of Transition to the Market: Theoretical Underpinnings," *Soviet Studies*, Vol.43, no.4, pp. 669-676.
- World Bank, 1993, *Kazakhstan: The Transition to a Market Economy*.
- World Bank and State Statistics Committee of the Russian Federation, 1995, *Report on the National Accounts*.
- World Bank, 1996a, *The Chinese Economy. Fighting Inflation, Deepening Reforms*.
- World Bank, 1996b, *Statistical Handbook 1996 States of the Former USSR*.
- World Bank, 1997a, *Kazakhstan: Report on the National Accounts*.
- World Bank, 1997b, *Kazakhstan: Transition of the State*.

Zettelmeyer J., 1993, "Relative Price Shocks, Capital Shortage and Aggregate Labor Demand: Analysis of a Simple CES Model," mimeo (Cambridge, Massachusetts: MIT).