PROBLEMS

*Soviet Industrial Expansion Under Late Stalinism (1945-55): The Short-Run Dynamic of Civilian Output From Demobilisation to Rearmament**

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1. Introduction

This paper represents a preliminary attempt to decompose the Soviet record of industrial growth of the first postwar decade into its constituent elements. Its aims are, first, to try to separate out the influence of postwar recovery as the industrial war economy ran down and productive capacity was released for peacetime uses: second, to try to pick out the influence of subsequent external disturbances such as the outbreak of war in Korea and the associated worldwide rearmament; third, to try to say something about the resumption of a long-term growth trend and of fluctuations about this trend.

The period of "late Stalinism" is of interest for several reasons. The concluding phase of Stalin's personal dictatorship coincided with Soviet recovery from a uniquely devastating war, in the course of which had arisen widespread (if ill formed) expectations of both international and internal relaxation; instead, while the war was ending investment mobilisation was re-

* For reasons of space only appendices "C" and "E" have been published; the other statistical appendices referred to in the text may be obtained directly from the author.

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sumed, to be followed by new purges and Cold War. Only after the death of Stalin and settlement of the post-Stalin succession would realisation of popular postwar aspirations begin to seem feasible once more.

Understanding of this postwar transition depends in part on the timing and pattern of postwar industrial growth. Was the rapid industrial expansion of the late 1940s simply a product of postwar recovery superimposed upon a long-term trend, or was there an additional element of Stalinist enthusiasm and excessive mobilisation? Was the decline in industrial growth after 1950 merely the result of completed postwar recovery, or was there also an element of economic exhaustion and cyclical retrenchment? What may be learned from the pattern of industrial growth about the gains from postwar demilitarisation and the incidence and costs of the subsequent rearmament? As we shall see, such questions can hardly be answered from visual inspection of aggregate production indices and require a more detailed assessment of the evidence.

2. Background and concepts

Definition of the Soviet economy's postwar recovery, and the distinction of recovery processes from the resumption of normal peacetime economic growth and fluctuations, are more complex than might appear at first sight.

As a preliminary step, it is necessary to be clear about what falls under the general heading of economic recovery from war. This general heading included at least three aspects. First there was *demobilisation*, the release of people and material resources from the armed forces and their logistical apparatus for reemployment in the economy. This included the demobilisation of soldiers from the armed forces, the ending of defence contracts and the relaxation of the claims of defence upon capacity in all branches of the economy. Second, an essential step for economic recovery was *technological reconversion*, the return of industrial capacity to peacetime uses and to the production of civilian goods. Where rolling mills were converted for production of armour plate, locomotive workshops for tank building and typewriter factories for the assembly of small arms, retooling must now be carried out in reverse. Third, *normal capacity utilisation* had to be restored, allowing the reestablishment of several million jobs in the civilian economy. The interlinkage of production, distribution and exchange, distorted and broken by the emergencies of warfare, had to be recreated in some sort of harmony for full employment to be regained on peaceful lines.

There is no strict separation between these three aspects of postwar recovery. However, it is clear that in some measure they represented a sequence because technological reconversion could not take place without some degree of demobilisation, and because normal capacity utilisation could not be restored without reconversion. Moreover, they also stood in ascending order of

effort and time required. Demobilisation could be carried out in months, and technological reconversion in a year or so, while the restoration of normal capacity working might in practice take several years. The recovery process as a whole would inevitably be complicated by the fact that the economy would naturally not be restored on the precise lines of the prewar period — new technologies, new products, a new resource balance and the modification of long-term objectives arising from wartime experience and the lessons drawn from it would all alter the pattern of development.

Postwar recovery, defined in this way, may be different from recovery attempted within the parameters of war. Strictly speaking the Soviet economy's recovery from the horrifying traumas of invasion and occupation by Nazi Germany had begun long before the cessation of hostilities. Such wartime recovery efforts were focused mainly upon the needs and possibilities of economic restoration of territories liberated from German occupation. However, while the war continued, the recovery process remained dominated by war needs - the need to sustain and expand the economic foundations of the Soviet Union's military might. It was accompanied by a commitment of resources to the war effort which grew steadily in real terms (although after 1943 it fell somewhat as a share of national income). Only in the spring and summer of 1945 did operational decisions begin to reflect the return to peacetime objectives and permit demobilisation and reconversion on a large scale.[1]

With the return to peacetime conditions, including rapid demilitarisation and the substitution of civilian for war production, economic recovery entered a new phase. According to official statistical indices shown in Table 1, within a few years the Soviet economy had restored and then exceeded 1940 output levels in nearly all the main branches of the economy – by 1947 in group "A" industrial products (capital and military goods), and by 1949 in group "B" industrial products (consumer goods). (Agricultural output faltered, however, and exceeded the prewar record for the first time in 1952). At the same time, the moment of "recovery" measured by 1940 benchmarks did not mark an automatic slowdown in postwar economic growth, which continued for several more years at an abnormally rapid rate. Apparently superimposed on the recovery process was a prolonged industrial boom which both accelerated the recovery process and also caused accelerated industrial expansion to persist for longer than the restoration of 1940 capacity utilisation alone could explain.

Part of the problem is that there was no one moment when prewar production and capacity utilisation were restored throughout industry. If we consider sectors producing goods for industrial users, for example, the official index of group "A" gross production reached its prewar peak in 1940, and regained this level in 1947. And this represented reality for such basic

[1] For more detailed discussion see HARRISON, 1985, pp. 192-7.

goods as coal, steel and cement. But in the engineering industry the picture was much more complex. In the composition of 1940 output a predominant place had been occupied by military goods, while the output of civilian products had been depressed by rearmament. For railway equipment the prewar peak had been in 1935-6, for agricultural machinery 1936-7, and for motor vehicles 1938. Reestablishing 1940 output levels in civilian engineering was already not so difficult; regaining the true prewar maximum would require a bigger production upsurge lasting typically until 1949-50. Thus, distinguishing the contribution of recovery processes from the return to normal peacetime growth and fluctuations cannot be done on the basis of studying the aggregate indices shown in Table 1 (see separate enclosure).

Neither, by the same token, can recovery processes be distinguished from the return to a normal pattern of peacetime economic fluctuation by means of a simple chronological distinction between recovery and postrecovery phases. The prewar cycle of industrial mobilisation and retrenchment had already been restored before peace broke out, and did not wait for completion of postwar recovery. Thus it is not possible to arrive at a chronological boundary between postwar recovery and the resumption of normal industrial growth and fluctuation. The two ran concurrently and in combination. This further means that the postwar recovery phase and the first postwar industrial upsurge did not necessarily end at the same moment. Thus distinguishing between them is a complex analytical task.

How should normal Soviet industrial fluctuation be conceived? Prewar industrial growth was dominated by a tension between the needs of resource mobilisation (aimed at developing the economy and defending economic gains from external enemies) and the requirements of economic equilibrium. Resource mobilisation resulted in rapid growth of output, fixed capacity and employment, but periodically mobilisation went too far; shortages not only of consumer goods but of capital goods became extreme and the economy's inner balances became disrupted. Unforeseen exogenous shocks arising from the natural, trading and strategic environment also acted upon both plans and the resources available to supply them. Industrial growth decelerated just when demands upon industrial capacity were at their most intense. Retrenchment and a scaling down of plans and aspirations helped to restore equilibrium and create the conditions for renewed resource mobilisation. This generated a cyclical pattern, based on an endogenous (but not deterministic) interplay of economic, social, political and strategic factors. The underlying tension in the economic system also contributed to the economy's long term pattern of rising output and employment combined with declining growth rates and falling capital productivity. This long-term pattern arose out of the economy's short-term movements. It was the same tendency towards indiscriminate resource mobilisation and the maximisation of fixed capacity at any cost which gave rise to both the short-run dynamic and the secular trend.

Within the period of late Stalinism distinguishing recovery processes from

peacetime trends and fluctuations is especially difficult because peace was itself relative. Between 1945 and 1955 the strategic environment passed through several changes. In all countries military demobilisation was confined to 1945-6. From the Soviet perspective international relations worsened markedly from the launching of the Marshall Plan in June 1947, the Berlin blockade of June 1948-May 1949 and the formation of NATO in April 1949. From the point of view of new defence burdens the commitment to North Korea and the outbreak of the Korean war (June 1950-July 1953) were especially important. These events were associated with a slowdown and reversal of the economy's demilitarisation, and may have correspondingly offset the previous work of demobilisation, reconversion and restoration of full capacity working.

I do not know of previous attempts to resolve these issues. Existing Soviet accounts of the Soviet economy under late Stalinism are limited to description of factors aiding or complicating postwar recovery;[2] Western accounts tend to conclude with Stalin's death, so that the phase of post-Stalin intrigues and international complications does not enter the story.[3]

3. Aims and methods

In this paper I seek to develop two distinct models for analysis of industrial output growth. I hesitate in calling them "models" because they are not fully fledged analytical economic models relating outputs to demands, resources and the organisation of supply and distribution. The information is not available on a year-to-year basis to make the construction of such models worth while.[4] Instead, I attempt some less ambitious tasks. To carry them out I use official data of the annual output (1945-55) of some 38 industrial products measured in physical terms. I divide these into three groups, each of which forms a separate panel. The groups are: *basic goods* (eight items such as coal, oil, steel, cement), *civilian machinery* (twelve items of industrial equipment and machinery, railway equipment and road vehicles, farm machinery), and *consumer durables* (eighteen items of clothing, footwear and household goods such as furniture, electrical goods, radios and bicycles). There are no data on the production of military goods in this period.

The distinction between basic goods, civilian machinery and consumer durables has a simple logic. Basic goods and civilian machinery were the object of investment plans formed by government authorities and enterprise

[2] E.G. Khlusov, 1977, pp. 28-39; ISE, vol. 6, 1980, pp. 51 ff.

[3] Jasny, 1961, pp. 245-7; Zaleski, 1980, pp. 370-4; while interesting in other respects for his interpretation of industrial policy and results Dunmore, 1980 also does not address these issues.

[4] However, such patterns can be analysed over longer periods; see for example Harrison, 1987.

managements, whereas consumer durables were the object of consumption plans formed by government and households. All were the object of postwar recovery efforts, but only basic goods and civilian machinery benefited from government investment priorities. The distinction between basic goods and civilian machinery is necessary for consideration of the hidden role of defence procurement. Basic goods were complementary in demand with military goods. In the short term, at least, both civilian machinery and consumer durables were directly competitive with military goods in both demand and supply. Engineering, metalworking and the electrical industry were the prime focus of technological conversion for war and of postwar reconversion. To a lesser extent woodworking, clothing and footwear also used raw materials, fixed capacities and labour power which could be alternatively commanded for military supply. Thus the legacy of war and new government defence priorities could be expected to affect the output of civilian machinery and consumer durables differently from that of basic industrial goods.

I use these data to answer two related sets of questions. First, to what extent was the postwar acceleration of industrial growth a phenomenon of recovery, and to what extent did it reflect a further, simultaneous mobilisation of resource and capacities superimposed upon the recovery process? To what extent did the rearmament associated with the Korean conflict result in additional acceleration or deceleration of industrial growth? Who bore the burdens of the Korean rearmament – investors or consumers? Is it possible to pick out a postwar industrial cycle, with phases of mobilisation and retrenchment? The method used to attempt an answer to this set of questions is the correlation of changes in the output of the three groups of products with dummy variables representing the postwar recovery process and the temporary (1950-3) return to limited war.

Second, to what extent did observed fluctuations of industrial growth reflect the direction of government policies and priorities, and what was the impact of the latter? Did changes in investment and defence spending accelerate or retard industrial growth, category by category? Here the method used is the correlation of changes in industrial output with measures of government policy: changes in the budget shares of investment and defence and, alternatively, changes in real expenditure on these items.

Why is it necessary to establish independent models for these two related sets of tasks? The reason can be seen in the interaction of the economic system, its circumstances and the policies pursued by government in generating industrial growth and fluctuation. The first set of tasks, and the first model, emphasise the role of circumstance. The second set of tasks, and model, emphasise policy. Circumstances and policy interact with each other as well as with the economic system; circumstantial and policy variables will be in some degree collinear. The relationship between them involved perceptions and expectations which may have been rational at some times, adaptive or extrapolative at others. Consequently a single equation model amalgamating

both sets of variables and tasks could not be expected to distinguish their influence satisfactorily.

4. Trend growth, war disturbances and fluctuations

Before results of the first model are presented, the way in which dependent and independent variables were defined and selected must first be explained. Dependent and independent variables are presented at greater length in Appendices A and B.

Dependent variables (DLN. BASIC, DLN. MACH, DLN. CONS). Dependent variables are the annual percentage growth rates (strictly, the first differences of the natural logarithms) of outputs of each item of basic goods, civilian machinery and consumer durables. Underlying data in physical units of output are listed in Appendix A.

Independent variables (RECOVER). For each product within each of the groups, a *RECOVER* variable was defined equal to one in each postwar year for which output was less than the prewar peak output, and zero in each subsequent year. If prewar peak output was not known, 1940 output was taken; if (as for some new product lines) prewar output was negligible or zero, this variable was set at zero throughout (for a product breakdown see Appendix B). In its first formulation it was found that this variable was generally highly significant, but the assumption that recovery was a uniform influence, year by year, up to the moment of restoration of prewar peak output was unduly restrictive. Rather than impose some other arbitrary assumption such as a continuously declining curve of output gains from recovery, I chose to break this variable up year by year and allow the regression programme to estimate the time path of recovery. *RECOVER* variables pertaining to years with insignificant recovery coefficients were dropped (but these were always later years, so that no gaps were created in the estimation of the recovery process); those for adjacent years with insignificantly different coefficients were combined. This method bears the cost that some fluctuation arising from other sources is attributed to recovery processes; this is more so for earlier years in which the largest numbers of products are still subject to recovery influences. However, nonrecovery influences may still be discernible for each product group within the recovery period.

Other independent variables (KOREA, HARVEST, MALENKOV). For each panel a *KOREA* variable was defined equal to one twelfth for each full month of each year within which the Korean conflict was waged (so it stood at 0.5 in 1950 and 1953 and one in 1951-2; see Appendix B), and zero at other times. It was uniform across each panel and, unlike *RECOVER*, was not differentiated by product. It was aimed simply at discovering whether product growth rates were significantly different in this period from those observed in adjacent years. Other variables of this type were also defined and tested, but were all discarded on criteria of significance. They included *HAR-*

VEST, a variable defined equal to one in years following poor grain harvests and zero at other times, and a variant of *HARVEST* set to one for 1947 alone in an attempt to capture the impact of the 1946 harvest failure; and *MALENKOV*, a variable defined equal to one in 1954-5 during operation of G.M. Malenkov's programme of 28 October 1953 for the expansion of consumer goods output and commissioning of new capacities for their production. However, only *KOREA* provided any significant explanation of any dependent variable at any stage of analysis.

Selection of independent variables in regressions. Independent variables were included if, when correlated singly against industrial output growth, they showed a significant association or if, when included in a multiple correlation, they showed a significant association without detracting from the significance of variables already selected on the basis of single correlation. The criterion for selection or rejection was the 5 per cent significance level. When choosing between alternative formulations of dependent variables, attention was paid to the explained sum of squares and to the significance of the regression as a whole, as well as to the significance of individual regression coefficients. In practice there were few difficult choices. The main issue proved to be the appropriate formulation of *RECOVER* (discussed above).

Presentation of results. Results of the first model are presented in Table 2 and Chart 1 (see separate enclosure). (The regressions on which they are based are given in Appendix C, Regressions C. 1-3). The first part of Table 2 shows that the basic industries displayed a relatively short recovery period (output growth significantly associated with *RECOVER* was limited to 1946-7) in which explained output growth was 20 per cent per year, 6 points above the postwar trend of 14 per cent per year. For civilian engineering recovery was both more uneven and more prolonged, and involved a much higher degree of acceleration above a much faster trend rate of growth. On top of trend output growth of 30 per cent annually throughout the period, civilian machinery output growth significantly associated with *RECOVER* stood at 72 per cent in 1946 and 35 per cent per year in 1947-8. However, by 1949 the recovery momentum had disappeared. Recovery was most prolonged, and of intermediate rapidity, in the case of consumer durables. On top of trend output growth of 24 per cent annually, output growth significantly associated with *RECOVER* stood at 58 per cent in 1946 and 23 per cent per year in 1947-9.

Such differences of performance during the recovery phase and of postrecovery trend are readily explicable in terms of our initial hypotheses. The basic industries, although severely damaged by the German invasion, had already been largely revived by 1945. Only in the case of cement was 1945 output much less than three fifths of the prewar peak. At least in relative terms, recovery was typically completed quickly and smoothly within a couple of years. In the civilian engineering and consumer durable sectors the picture was completely different. In nearly all cases 1945 output levels were

down to one half to one third (woven textiles), one third to one fifth (cars and buses, footwear), one fifth to one tenth (turbo-generators, most household furniture), or less than one tenth (most railway equipment and agricultural machinery, most personal and other household durables) of the prewar peak. Apart from decommissioning of capacity as a direct result of enemy action, the main reason was the widespread wartime conversion of the producing sectors to war output, or their starvation of necessary inputs. Technological reconversion appears to have taken place within 1945-6 and was accompanied by the superfast output growth associated with *RECOVER46*. Subsequent recovery processes were mainly concerned with restoration of normal capacity utilisation, and their pace (although still rapid) was markedly slower than the hectic early tempos.

What was the impact upon postrecovery industrial growth of the Korean war period and associated rearmament? Investigation showed no significant change in the growth of output of basic goods and of consumer durables associated with *KOREA*. Civilian machinery output growth, however, seems to have been strongly affected. In each full year of the Korean conflict, civilian machinery growth was depressed by 34 per cent (since the explained trend rate of output growth is 30 per cent annually, this means that explained growth was negative). The conclusion to be drawn is that during the Korean war technological conversion for the production of military goods was confined to the engineering industry, and did not influence the yearly growth of output of consumer durables. In the short term, anyway, the burden was borne by industrial equipment users, not by household consumers. Rearmament resulted in diversion of resources from investment, not consumption. Of course this finding is confined to short-run effects and does not exclude longer-term influences of the Soviet economy's defence burden upon the growth of living standards.

No evidence could be found of any influence upon the general pattern of industrial output growth which could be traced back either to poor harvests, or to the consumer goods programme announced by Malenkov in late 1953. However, the most obvious field of influence of poor harvests, food processing, is not included in our sample of industrial products.

The last part of Table 2, also shown in Chart 1, considers the residual of unexplained industrial growth. Study of such residuals may tell us something about systemic fluctuation of the industrial economy. At the same time, two qualifications should be borne in mind. First, the reader ought to be aware that the unexplained residuals capture both systemic and stochastic fluctuation. Without a fully fledged quantitative model of systemic fluctuation (denied us by deficiencies of data) it is impossible to be sure that what we observe represents tendencies towards resource mobilisation or retrenchment rather than accidental movements. Second, because the estimating equations typically explain only a small part of the variation in industrial growth within each product group in each year taken separately, the standard deviations of

the mean residuals for each separate year are relatively large compared with the mean residuals themselves; consequently, at the level of the product group, unexplained output growth in each year was never significantly different from zero at the 5 per cent or even 10 per cent level. By such criteria the postwar cycle was weak.

Subject to these qualifications, the evidence of unexplained industrial growth can be divided into two periods. First, in the first postwar years investment goods sectors may have enjoyed some output growth above that explicable in terms of recovery processes and underlying trends; this abnormal growth is discernible as early as 1947 in the case of civilian engineering and 1948 in the case of basic industries, and it lasted until 1950 or thereabouts. In these years no such abnormal growth of consumer durables can be suggested (however, the cessation of abnormal growth of investment goods in 1951 does coincide with a sudden unexplained spurt of consumer durables production). Second, after 1950 unexplained growth in the investment goods sectors tended to be negative. Third, after 1950 the unexplained growth of basic goods output was very small and consistently negative; in contrast unexplained growth of civilian machinery and consumer durables became rather uneven, although still close to zero in statistical terms. Consumer durable output growth showed a rapid fluctuation with peaks in 1951 and 1954. Over the short period after 1950 these seem to have followed about one year behind unexplained fluctuations in the output of civilian machinery, but observations are too few and data too imprecise to discover any significant link to which causation might be imputed. For civilian engineering the trend of unexplained growth was downwards with one more little peak (after 1950) in 1953 (an alternative possibility is that the influence of the Korean war in 1951–2 was more disturbing than the KOREA variable led us to expect).

Two generalisations may be attempted, but neither is statistically reliable. First, in the recovery phase the two sectors producing investment goods shared an abnormal mobilisation of resources and production, not marked in the consumer durables sector. This mobilisation ended in 1950. Second, in the following period, the civilian machinery and consumer durables sectors shared a pattern of fluctuation in which mobilisation of resources for engineering production may have been associated with concurrent retrenchment of resources for consumer durables output, but followed shortly afterwards by acceleration of the latter sector's unexplained output growth.

5. The role of economic policy

In this section I move on to a new set of questions about the influence of economic policy on industrial output growth. The policy issues considered are government priorities for allocation of resources to investment for national economic development, to national defence and to personal consumption. Dependent variables, and the method of selection of independent variables,

are essentially similar to those noted in the previous section. However, some explanation of the independent variables themselves is due. Their calculation is explained in more detail in Appendix D.

Investment expenditure (DLN. PI55, DLN.CI55, D. CAPSHARE)

Investment spending was measured in both real terms, and as a share of total government budget spending. Official series are available for both centralised government investment and public sector investment as a whole at 1955 prices. Throughout the period government consistently accounted for the great bulk of public sector investment, but there were small changes in the share of decentralised investment from year to year. The yearly proportional change in investment was measured by the first differences of the natural logarithms of each series. In practice the change in public sector investment (DLN. CI55) wielded consistently greater explanatory power than that of centralised investment (DLN. PI55) alone. The other measure of government policy with respect to resource allocation is the yearly change in the share of government investment investment in total budget spending (D.CAPSHARE).

Defence expenditure (DLN. DEF, D. DEFSHARE)

Defence spending too was estimated in real terms and as a share of total government budget spending. In the absence of official measures of real defence spending, nominal defence allocations were deflated by retail and heavy industry wholesale prices to yield an independent estimate. The yearly proportional change in defence spending was measured by the first differences of the natural logarithms of the resulting series (DLN. DEF). The government priority attached to defence needs is also measured by the yearly change in the share of defence spending in total budget spending (D.DEFSHARE). The reader may wonder whether the shares of government investment and defence in total budget spending tended to be collinear. In fact, over the period in question, there was no significant relationship between them.

Presentation of results

The correlation of industrial output growth with these independent measures of priority in resource allocation gives rise to clear findings which both confirm and add to existing results. (The regressions upon which these findings are based are reported in full in Appendix E.) First, the growth of basic goods was not significantly associated with changes in defence allocations. However, basic goods output growth is strongly linked with changes in both the volume and budget share of investment (Appendix E, Regressions E. 1-2).

An increase of 10 percentage points in either the growth rate of real public sector investment or the budget share of government investment would raise the growth rate of basic goods output by 5.8 or 7.7 points respectively. Both relationships are strong and significant, but the correlation with change in real public sector investment possesses superior explanatory power.

As may be expected, the performance of civilian machinery output growth requires more complex explanation. There is no significant link with changes in real investment spending; the relationship with real defence spending is significant and negative – an increase of 10 percentage points in the growth rate of defence spending tended to pull down civilian machinery output growth by 11.8 points (Regression E.3). When this relationship is tested separately for two sub-periods, 1946-50 and 1951-5, it remains significant for each, and the size of the relationship does not change significantly between the two sub-periods (Regressions E.4-5). Thus, the inverse link between defence procurement and civilian engineering remained essentially constant throughout postwar demilitarisation and Cold War rearmament.

When civilian machinery output growth is regressed against budget shares allocated to defence and investment, both independent variables prove significant, although the inverse relationship with defence spending remains stronger. A transfer of resources into defence allocations amounting to a 10 per cent budget share tended to lower civilian machinery output growth by no less than 44 per cent annually; if the resources came out of government investment, civilian machinery output growth would tend to fall by a further 37 per cent per year (Regression E.6). Again, this relationship can be tested separately for the late 1940s and early 1950s. With a reduced number of observations the role of the investment budget share now becomes insignificant. The significance and size of the link with the defence share again remains essentially unchanged in each sub-period (Regressions E.7-8). This confirms our previous finding that the engineering industry was a prime focus of technological reconversion during the postwar recovery period, and of renewed conversion for defence production during the subsequent rearmament.

In explaining the growth of consumer durable output, investment allocations do not play a significant role. The relationship with defence allocations is significantly inverse, but changes through time. Over the period as a whole, we find that a 10 percentage point increase in real defence expenditure growth, or a 10 percentage increase in the defence budget share, would lower consumer durable output growth by 5.5 and 21.8 points respectively (Regressions E.9, E.12). In each case the bulk of this relationship's explanatory power is supplied by postwar demilitarisation (Regressions E.10, E.13). When the period of observation is limited to 1951-5 in each case the regression loses all significance (Regressions E.11, E.14). This confirms our previous finding that during the Korean war technological conversion for the production of military goods was confined to the engineering industry, and did not influence the

yearly growth of output of consumer durables; in the short term, the burden was borne by industrial equipment users, not by household consumers.

6. Conclusions

Empirical work suggests six main findings. First, in spite of the uncertain showing of official indices of group "A" production, the growth of output of all branches of civilian industry in the first postwar years was strongly boosted by recovery processes. This reflects the fact that the economic burden of World War II had squeezed all categories of civilian expenditure – investment and consumption alike. The acceleration due to postwar recovery was strongest and most continuous in sectors competitive with military goods in both supply and demand (civilian engineering, then consumer durables), and made a much smaller, more short-lived contribution to basic goods output growth.

Second, the evidence suggests (although more weakly) that in 1947-8 the growth of civilian investment goods was more rapid than could be accounted for by recovery alone, and that this investment-led upsurge continued beyond the recovery period to 1950.

Third, when the effect of the Korean war on postwar civilian industrial growth is estimated, it is found that the growth of output of basic industrial goods and of consumer durables was not significantly affected. However, the growth of civilian engineering output was significantly depressed at this time, suggesting that the main burden of this relatively limited conflict was met out of current investment, and was borne by industrial equipment users rather than consumers. This could indicate either short-run constraints on the increased supply of military goods and civilian machinery simultaneously, or the maintenance of a relatively high priority accorded to civilian consumption at this time.

Fourth, after taking into account both the ending of postwar recovery and the possible effects of the Korean war, there is weak evidence to the effect that the early 1950s tended to be a period of depressed growth in all the main branches of industry, with the possibility of a rapid, interactive cycle of machinery and consumer durables output.

Fifth, the output of basic industrial goods was significantly associated with investment, not defence spending, whereas civilian machinery output growth was mainly (and negatively) associated with defence spending. The latter association was of roughly equal size and significance in both the period of postwar demilitarisation and the subsequent rearmament. This tends to support the idea of civilian producer and military equipment coming from a common pool of overall engineering capacity which was fixed in the short-run, with the short run division of this capacity between supply of the economy and of the military being determined by rapid changes in requirements of national security.

Sixth, however, after 1945 when national survival had already ceased to be at stake, the production of household durables was protected from the encroachments of increased defence procurement. Thus the growth of consumer durables output was mainly (and negatively) associated with defence expenditure, but the bulk of this relationship is accounted for by the demilitarisation of the late 1940s; when the early 1950s are considered in isolation, the relationship is insignificant. This confirms the view that in the short run the chief burden of the Korean rearmament was borne out of investment, not consumption. Policy, not circumstance, was at work here since consumer durables were intensive in the same energy, metals and mechanical and electrical components as civilian machinery and military goods, and were manufactured within the same pool of common, convertible engineering capacity. Defence priorities could have squeezed household durables output in the same way as they squeezed investment supply. Finance of the Korean rearmament out of investment resources, cushioning household living standards, was to this extent a deliberate act.

APPENDIX C: REGRESSIONS C.1-3

BASIC INDUSTRIAL GOODS

C.1 Dependent variable = DLN. BASIC

Explained sum of squares	0.350294E−01	Deg. freedom	1	Mean	0.350294E−01
Residual sum of squares	0.474340	Deg. freedom	78	Mean	0.608128E−02
Total sum of squares	0.509369	Deg. freedom	79		
F for regression	5.76020	Probability			0.187773E−01
Multiple correlation	0.262241	Determination			0.687702E−01
Std error of estimate	0.779826E−01	Corrected det.			0.568313E−01

Variable	*Coefficient*	*Standard err.*	*t*	*Probability*
Constant	0.141865	0.938800E−02	15.1113	0.000000E+00
RECOVER46−7	0.607632E−01	0.253175E−01	2.40004	0.187773E−01

CIVILIAN MACHINERY

C.2 Dependent variable = DLN. MACH

Explained sum of squares	10.9989	Deg. freedom	3	Mean	3.66628
Residual sum of squares	28.1436	Deg. freedom	113	Mean	0.249059
Total sum of squares	39.1425	Deg. freedom	116		
F for regression	14.7206	Probability			0.371869E−07
Multiple correlation	0.530090	Determination			0.280995
Std error of estimate	0.499058	Corrected det.			0.261907

Variable	*Coefficient*	*Standard err.*	*t*	*Probability*
Constant	0.303038	0.745610E−01	4.06430	0.893222E−04
Korea	−0.342983	0.127700	−2.68584	0.832540E−02
Recover46	0.719727	0.174543	4.12349	0.715184E−04
Recover47−8	0.348546	0.136630	2.55103	0.120776E−01

CONSUMER DURABLES

C.3 Dependent variable = DLN. CONS

Explained sum of squares	4.99967	Deg. freedom	2	Mean	2.49984
Residual sum of squares	29.7748	Deg. freedom	173	Mean	0.172108
Total sum of squares	34.7744	Deg. freedom	175		
F for regression	14.5248	Probability			0.147529E−05
Multiple correlation	0.379176	Determination			0.143774
Std error of estimate	0.414860	Corrected det.			0.133876

Variable	*Coefficient*	*Standard err.*	*t*	*Probability*
Constant	0.239679	0.368128E−01	6.51074	0.780421E−09
Recover46	0.576124	0.116827	4.93141	0.190395E−05
Recover47−9	0.227607	0.791995E−01	2.87385	0.456364E−02

APPENDIX E: REGRESSIONS E.1-14

BASIC INDUSTRIAL GOODS

E.1 Dependent variable = DLN. BASIC (1946-55)

Explained	sum of squares	0.622393E−01	Deg. freedom	1	Mean 0.622393E−01
Residual	sum of squares	0.447130	Deg. freedom	78	Mean 0.573243E−02
Total	sum of squares	0.509369	Deg. freedom	79	

F for regression	10.8574	Probability	0.148187E−02
Multiple correlation	0.349555	Determination	0.122189
Std error of estimate	0.757128E−01	Corrected det.	0.110935

Variable	*Coefficient*	*Standard err.*	*t*	*Probability*
Constant	0.716975E−01	0.252891E−01	2.83511	0.583149E−02
DLN. PI55	0.576348	0.174913	3.29506	0.148187E−02

E.2 Dependent variable = DLN. BASIC (1946-55)

Explained	sum of squares	0.366779E−01	Deg. freedom	1	Mean 0.366779E−01
Residual	sum of squares	0.472691	Deg. freedom	78	Mean 0.606014E−02
Total	sum of squares	0.509369	Deg. freedom	79	

F for regression	6.05232	Probability	0.160995E−01
Multiple correlation	0.268340	Determination	0.720066E−01
Std error of estimate	0.778469E−01	Corrected det.	0.601092E−01

Variable	*Coefficient*	*Standard err.*	*t*	*Probability*
Constant	0.141790	0.935380E−02	15.1585	0.763278E−16
D. Capshare	0.766794	0.311686	2.46015	0.160995E−01

CIVILIAN MACHINERY

E.3 Dependent variable = DLN. MACH (1946-55)

Explained	sum of squares	9.3770	Deg. freedom	1	Mean 9.37700
Residual	sum of squares	29.7655	Deg. freedom	115	Mean 0.258830
Total	sum of squares	39.1425	Deg. freedom	116	

F for regression	36.2284	Probability	0.214316E−07
Multiple correlation	0.489449	Determination	0.239561
Std error of estimate	0.508754	Corrected det.	0.232948

Variable	*Coefficient*	*Standard err.*	*t*	*Probability*
Constant	0.346801	0.473187E−01	7.32905	0.340443E−10
DLN. DEF	−1.18344	0.196618	−6.01900	0.214316E−07

E.4 Dependent variable = DLN. MACH (1946-50)

Explained	sum of squares	3.42089	Deg. freedom	1	Mean 3.42089
Residual	sum of squares	23.2318	Deg. freedom	55	Mean 0.422396
Total	sum of squares	26.6527	Deg. freedom	56	

F for regression	8.09876	Probability	0.621235E−02
Multiple correlation	0.358260	Determination	0.128351
Std error of estimate	0.649920	Corrected det.	0.112502

Variable	*Coefficient*	*Standard err.*	*t*	*Probability*
Constant	0.485707	0.910858E−01	5.33241	0.187410E−05
DLN. DEF	−0.906595	0.318570	−2.84583	0.621235E−02

E.5 Dependent variable = DLN. MACH (1951-5)

Explained sum of squares	0.611688	Deg. freedom	1	Mean	0.611688
Residual sum of squares	4.66186	Deg. freedom	58	Mean	0.803769E−01
Total sum of squares	5.27355	Deg. freedom	59		

F for regression	7.61024	Probability	0.775149E−02
Multiple correlation	0.340576	Determination	0.115992
Std error of estimate	0.283508	Corrected det.	0.100750

Variable	*Coefficient*	*Standard err.*	*t*	*Probability*
Constant	0.186722	0.549753E−01	3.39647	0.123825E−02
DLN. DEF	−0.807448	0.292695	−2.75867	0.775149E−02

E.6 Dependent variable = DLN. MACH (1946-55)

Explained sum of squares	9.31235	Deg. freedom	2	Mean	4.65617
Residual sum of squares	29.8301	Deg. freedom	114	Mean	0.261668
Total sum of squares	39.1425	Deg. freedom	116		

F for regression	17.7942	Probability	0.188100E−06
Multiple correlation	0.487759	Determination	0.237909
Std error of estimate	0.511535	Corrected det.	0.224539

Variable	*Coefficient*	*Standard err.*	*t*	*Probability*
Constant	0.192036	0.525447E−01	3.65471	0.390763E−03
D. Defshare	−4.35081	0.824063	−5.27971	0.626028E−06
D. Capshare	3.74681	1.68332	2.22585	0.279911E−01

E.7 Dependent variable = DLN. MACH (1946-50)

Explained sum of squares	3.35707	Deg. freedom	1	Mean	3.35707
Residual sum of squares	23.2956	Deg. freedom	55	Mean	0.423557
Total sum of squares	26.6527	Deg. freedom	56		

F for regression	7.92589	Probability	0.675081E−02
Multiple correlation	0.354903	Determination	0.125956
Std error of estimate	0.650812	Corrected det.	0.110064

Variable	*Coefficient*	*Standard err.*	*t*	*Probability*
Constant	0.436320	0.984874E−01	4.43021	0.452809E−04
D. Defshare	−3.31527	1.17759	−2.81530	0.675081E−02

E.8 Dependent variable = DLN. MACH (1951-5)

Explained sum of squares	0.655636	Deg. freedom	1	Mean	0.655636
Residual sum of squares	4.61791	Deg. freedom	58	Mean	0.796192E−01
Total sum of squares	5.27355	Deg. freedom	59		

F for regression	8.23465	Probability	0.572538E−02
Multiple correlation	0.352598	Determination	0.124325
Std error of estimate	0.282169	Corrected det.	0.109228

Variable	Coefficient	Standard err.	t	Probability
Constant	0.797001E−01	0.364906E−01	2.18413	0.330097E−01
D. Defshare	−4.47170	1.55829	−2.86961	0.572538E−02

CONSUMER DURABLES

E.9 Dependent variable = DLN. CONS (1946-55)

Explained	sum of squares	3.09754	Deg. freedom	1	Mean 3.09754
Residual	sum of squares	31.6769	Deg. freedom	174	Mean 0.182051
Total	sum of squares	34.7744	Deg. freedom	175	

F for regression	17.0147	Probability	0.573832E−04
Multiple correlation	0.298455	Determination	0.890753E−01
Std error of estimate	0.426674	Corrected det.	0.838401E−01

Variable	Coefficient	Standard err.	t	Probability
Constant	0.336201	0.321887E−01	10.4447	0.416334E−16
DLN. DEF	−0.550397	0.133433	−4.12489	0.573832E−04

E.10 Dependent variable = DLN. CONS (1946-50)

Explained	sum of squares	2.03436	Deg. freedom	1	Mean 2.03436
Residual	sum of squares	21.6099	Deg. freedom	84	Mean 0.257260
Total	sum of squares	23.6442	Deg. freedom	85	

F for regression	7.90779	Probability	0.612594E−02
Multiple correlation	0.293327	Determination	0.860404E−01
Std error of estimate	0.507208	Corrected det.	0.751600E−01

Variable	Coefficient	Standard err.	t	Probability
Constant	0.369903	0.583115E−01	6.34357	0.108131E−07
DLN. DEF	−0.559816	0.199075	−2.81208	0.612594E−02

E.11 Dependent variable = DLN. CONS (1951-5)

Explained	sum of squares	0.230734E−01	Deg. freedom	1	Mean 0.230734E−01
Residual	sum of squares	9.55744	Deg. freedom	88	Mean 0.108607
Total	sum of squares	9.58051	Deg. freedom	89	

F for regression	0.212448	Probability	0.645992
Multiple correlation	0.490752E−01	Determination	0.240837E−02
Std error of estimate	0.329556	Corrected det.	−0.892790E−02

Variable	Coefficient	Standard err.	t	Probability
Constant	0.252822	0.458305E−01	5.51646	0.342964E−06
DLN. DEF	−0.118425	0.256932	−0.460921	0.645992

E.12 Dependent variable = DLN. CONS (1946-55)

Explained	sum of squares	2.91629	Deg. freedom	1	Mean 2.91629
Residual	sum of squares	31.8581	Deg. freedom	174	Mean 0.183093
Total	sum of squares	34.7744	Deg. freedom	175	

F for regression	15.9279	Probability	0.968509E−04
Multiple correlation	0.289591	Determination	0.838629E−01
Std error of estimate	0.427893	Corrected det.	0.785978E−01

Variable	*Coefficient*	*Standard err.*	*t*	*Probability*
Constant	0.286932	0.340727E−01	8.42118	0.136002E−13
D. Defshare	−2.17931	0.546060	−3.99098	0.968509E−04

E.13 Dependent variable = DLN. CONS (1946-50)

Explained sum of squares	1.82921	Deg. freedom	1	Mean	1.82921
Residual sum of squares	21.8150	Deg. freedom	84	Mean	0.259702
Total sum of squares	23.6442	Deg. freedom	85		

F for regression	7.04349	Probability	0.951317E−02
Multiple correlation	0.278144	Determination	0.773640E−01
Std error of estimate	0.509610	Corrected det.	0.663803E−01

Variable	*Coefficient*	*Standard err.*	*t*	*Probability*
Constant	0.343579	0.632629E−01	5.43097	0.535032E−06
D. Defshare	−1.95254	0.735710	−2.65396	0.951317E−02

E.14 Dependent variable = DLN. CONS (1951-5)

Explained sum of squares	0.298171E−01	Deg. freedom	1	Mean	0.298171E−01
Residual sum of squares	9.55069	Deg. freedom	88	Mean	0.108531
Total sum of squares	9.58051	Deg. freedom	89		

F for regression	0.274734	Probability	0.601491
Multiple correlation	0.557877E−01	Determination	0.311227E−02
Std error of estimate	0.329440	Corrected det.	−0.821600E−02

Variable	*Coefficient*	*Standard err.*	*t*	*Probability*
Constant	0.240112	0.347858E−01	6.90258	0.756029E−09
D. Defshare	−0.778624	1.48550	−0.524151	0.601491

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