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Essays in Economics

Considering the Communist Transition to Markets

by

John J. Blank

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ABSTRACT

Enclosed as a dissertation in economics are three research efforts, organized into four chapters, undertaken while the author was a graduate student in the economics department at M.I.T., during the years 1991-1995. During these years, the Cold War ceased, abruptly.

The first chapter, Restoring Entrepreneurial Capitalism, offers a formal explanation for the inward foreign direct investment boom, ongoing in 1995, in mainland China. The author tests a proposition that firms, operating under competitive market conditions, arbitrage profit rates between the home and host country, and initiate a disequilibrium direct investment flow. The arbitrage condition is created by immobile labor, separated by government and geography, in markets in the home and host country. The home country, where the capital flow begins, holds productive manufacturing capital. The firms which own this capital operate in a labor market where market conditions are tightening, causing a rise in the wages paid to labor. The host country, absent productive capital, but endowed with an elastic supply of labor, offers the competitive markets supplier a host market determined wage which is lower than the home country. Exploiting this labor cost difference is the primary motive for the movement of productive capital from the home country to the host country.

In the model, the formal determinants of this direct investment flow of capital were identified as a wage gap term, a labor intensity term, a technology term, and a combined markets term. The theory was tested using OLS regressions. The first set of regressions used approved contracts and utilized capital invested in China. At a country level, the amount of variation explained was high, anywhere from 72% to 96% of the total variation for the approved contracts figure. For utilized capital, the variation explained varies from 30% for the USA, 46% for Germany, 68% for Japan, and a high of 76% for Hong Kong. All variables, due to sample size, failed to be statistically significant at a 5% level. Hong Kong and Singapore recorded high elasticities for wages and low elasticities for

markets, while Germany, Japan, and the United States recorded negative elasticities on wages, and high, positive elasticities on markets. When the country data were aggregated into total data, the variation explained dropped to 27% and 32% respectively. The next sets of regressions separate the demand determinants from the supply determinants. The variation explained by the demand determinants was 3% or 12%, while 22% to 38% was explained by the supply determinants.

In summary, the econometric tests confirmed the implications of the model assumptions. These assumptions explain capital flow to developing countries as a disequilibrium arbitrage process, from the low wage countries to the lowest wage country, but not from the high wage countries to the lowest wage country. These two results are consistent with the disequilibrium hypothesis, on deeper reflection about the longevity of market disequilibrium in sectors where capital is highly mobile. As additional evidence, the amount of variation explained by supply determinants is much greater than that explained by demand determinants. And finally, the amount of explained variation is much greater at a disaggregated, individual level than at an aggregated level. All three pieces of evidence lend support to a bilateral arbitrage motive, and not to an aggregate movement of capital with vague aggregated economic determinants. The following chapter uses the dynamic profit assumption in an untested model of Socialist transition from authoritarian state subsidy to a capital accumulation market economy.

The second and third chapters, organized under the heading, From State Socialism to Entrepreneurial Capitalism, apply the dyamic profit theory tested on the China direct investment boom to examine the hypothetical path of a two sector production macroeconomy, thought of as Russia and its surrogate states, in disequilibrium transition from a command subsidy system to a dynamic, market-based, capital accumulation system. The reinvestment of profits on invested capital determines the speed and success of the economic transition. The models, explicitly in chapter two and implicitly in chapter three, critically assume that authoritarian politicians use state subsidy as an instrument to require state firms to produce certain goods. The government allocates the state firms capital in order to fulfill the order. Higher unit labor requirements are also required in order to secure political stability. The profits on invested capital then determine the dynamic path of capital accumulation for both the state sector and its emergent rival sector.

Collected facts indicate the new private sector expanded and the state sector collapsed in the face of market discipline. The facts indicate that the capital stock advantage was outweighed, at least initially, by the other legacies of the command system. A comparative dynamics analysis of the other determinants in the models conclude that the factually consistent explanation for the collapse of the state sector and the simultaneous rise of the private sector has been a sudden shift in demand for the set of goods each sector produces. The state output collapse suggests that consumers decided a number of state produced

goods were useless. The larger the number of goods deemed useless, the larger the decline in output. The demand discipline led to a price collapse for the state sector, a profits collapse, an investment collapse, and shedding of labor to maintain solvent state firms. Symmetrically, consumers deemed private goods desirable, the private sector witnessed a sharp rise in demand for private goods, a price rise, profit increases, accumulation of investment capital, and hiring of labor to produce the new goods. However, the collapse of demand for state goods dominated the increase in demand for private goods, so there has been negative labor productivity counted in the private sector, as shed workers in the state firms attach to private firms for survival.

A final section in both chapters discuss reform measures which might speed adjustment of the state subsidy firms. Privatisation returns the profit motive to the state firms, and this will ultimately drive down the high wages and inefficient high unit labor requirements, as the high wages and hoarded labor depress the profits to capital. This hoarded labor contributed to the slow adjustment of state firms, and, combined with the demand collapse, dominated the positive advantage of accumulated capital for the state sector. While privatization remains a sound platform for restructuring firms, investigating the existing conditions of reforms which privatize state enterprises suggest that the objective of maximizing shareholders returns to invested capital is not yet the primary objective for a majority of firms emerging from the command system.

The subsidy itself was discussed inside the model of chapter two. The unemployment benefit is treated more thoroughly in chapter three. The subsidy channel of distribution through a captive bank system is an advantage of the state sector over the private sector. The subsidy is aggregate spending, and hopefully domestic spending for the purpose of domestic accumulation. The subsidy is an existing insider social safety net. It is also a significant political interest which has strong incentives to frustrate attempts to reform state enterprises. An outside social safety net would remove the security argument for subsidy interests. However, profits collapse for state firms may leave these firms in need of working capital for proper adjustment. The subsidy and credit system must address this new market adjustment concern and not bankrupt firms with accumulated assets and labor that could adjust to serve consumers. In addition, subsidies to sectors of the economy which employ significant amounts of workers might be politically desirable to pay, using the insider social safety net argument. Chapter three explores, in detail, the effects of an unemplyment benefits system, or outside social safety net, on the speed of transition. The unemployment benefit is also aggregate spending, and can replace the inside social safety net of the labor component of state subsidy. Its cost will be most onerous early in the transition. A labor tax appears to dominate the profits tax as a means of financing the unemployment benefit.

In chapter two, the strong result of the unstable expansion of the state sector to serve all final demand is obtained. A stable result follows in the third chapter, after dropping the assumption of one market and two competing

sectors and assuming instead that there is relative demand for the goods of both sectors. Then, in the third chapter, an expanding state sector corresponds to rising demand for its goods, rising prices, and a widening of the relative price gap, with prices in the new private sector becoming relatively lower. These goods then become more attractive vis-a-vis the state goods, demand increases, profits increase, and capital accumulates in this sector as well, allowing for a stable disequilibrium transition to the binding labor constraint of equilibrium markets. In the third chapter, then, both sectors conclude the transition serving a component of total demand, a result more likely to hold in reality.

In addition, the model of the third chapter introduces a role for technology coefficients directly in the transition, it openly introduces a wage, nominalized in the second chapter, and the economic policy considerations, while similar to the policy consideration in the second chapter, are qualified and better developed. Hence, the need for two chapters, that is two models, on the transition to markets in Central Europe and Russia. One chapter, or model, to establish the effects of subisidy, the other chapter, or model, to better design the determinants of the transition itself.

The fourth, and final, chapter, One Lesson For Democracy ?, studies state subsidy and transfer allocations under democratic rule, or, more game theoretically, under a democratic state of nature. Facts on state subsidies and transfers, collected from 1972-1991, on twenty democratic states, show the highest proportion of transfers being made to individuals, followed by state and local governments, and finally, to industrial firms, and to members outside the polity, in the form of foreign aid. Pressure to alter appropriations was measured by counting the number of states which increased or decreased payments to each category. Pressure, over the sample period, was entirely consistent with the ranking of the level of state payments. Individuals often increased the proportion of payments, while state and local governments were less successful in comparison to individuals. Industrial firms and the foreign aid recipients more often saw budget cuts. In the case of foreign aid, allocations were cut annually in every democracy.

In order to explain these facts, a theory and analysis of transfer payments between individuals and the government under a democratic state of nature was conducted. The model assumes officeholders to be a delegated common agent. The officeholders determine the collective welfare of the polity by arranging subsidies and taxes. The polity is considered to be principals in a delegated common agent-many principal game. The polity provide campaign contributions and votes to the officeholder in exchange for subsidies and transfers. This arrangement was analysed for the single contributor in the game with the democratic government, with an organized lobby and an unorganized group of voters, and with two organized lobbies composing the entire polity.

For the individual, an increase in marginal contributions raised the amount of transfers in income. These contributions were most effective when the proportion of transfers in income was low. For an individual operating in a lobby,

in an unorganized polity, the means to a maximum transfer was to form a small lobby, elect a non-welfare minded government, and a government not concerned about voter support in the next election. For an individual operating in a lobby, in a fully organized polity, increasing the size, and voice, of the lobby is essential to greater transfers. The game results predict large, actively voting lobbies will crowd out smaller, less actively voting lobbies, and crowd out the effects of contributions, and determine the outcome of the transfer game. Under 'campaign reform' of no contributions allowed, the voter reaction functions, of large groups actively crowding out smaller groups in the polity, was the conclusion. Under the assumption that Western democracies operate in fully organized polities, this set of deteminants is most persuasive, and is consistent with the presented facts of transfers and subsidies under democratic rule.

The thesis author holds that the dynamic profit assumption, formalized and tested, and applied to explain the direct investment of capital in less developed countries, and to assist thinking about the effects of transition to dynamic markets in post-communist countries, is one contribution of the dissertation to the economics literature. Another contribution is to advance models of transfers as an identifiable component of a political regime, and to map the effects these payments have upon factor markets and individuals operating in the underlying economy. The final contribution is to attempt to formally integrate the market order, state socialism, and democracy, to answer to questions about the proper political and policy regime for successful development.

Thesis Supervisor: Dr. Rudiger Dornbusch

Title: Essays in Economics Considering the Communist Transition to Markets.

BIOGRAPHICAL NOTE

In 1984, John Blank graduated valedictorian from a public school: Red River Senior High School in Grand Forks, North Dakota. From 1984 to 1988, he attended Northwestern University in Evanston, Illinois. He graduated Phi Beta Kappa, with Honors and Distinction, with a bachelor of arts in the Honors Program in Mathematical Methods in Social Sciences and economics. A yet to be published undergraduate thesis titled, 'An Application of Game Theory to International Lending Constraints', and excellence in coursework, led to the James Alton James prize, awarded to the top three students in the social sciences at Northwestern University. The author is also a two time Rhodes Scholarship finalist. Upon graduation, the author lived in Kenya from 1988 to 1989, on work in a H.I.I.D. development project. From 1989 to 1991, the author was employed by the Boston Consulting Group, on work in corporate strategy.

Since 1991, the author has been at M.I.T. working towards a PhD in economics, with a major focus on international and macroeconomic issues. The author has taught five classes of Principles of Macroeconomics to the undergraduates at M.I.T. as part of a teaching assistantship. The thesis committee for this dissertation is: Olivier Jean Blanchard and Rudiger Dornbusch, both of M.I.T. and Jeffrey Sachs, of Harvard Unversity.

"the highest ambition an economist can entertain who believes in the scientific character of economics would be fulfilled as soon as he succeeded in constructing a simple model displaying all the essential features of the economic process by means of a reasonably small number of equations connecting a reasonably small number of variables. Work on this line is laying the foundation of the economics of the future and should command the highest respect of us all [1]"

–Joseph Alois Schumpter

[1] J. Schumpeter, "The American Economy in the Interwar Period–The Decade of the Twenties," *American Economic Review*, Proceedings, May 1946,3.

Chapter One:

Foreign Direct Investment as International Profit Arbitrage Under Competitive Market Conditions: The Case of China 1983-1992

John J. Blank

1 July 1994

*The author would like to thank Rudiger Dornbusch for a crucial early suggestion, about testing a proposition, made at the International Breakfast at MIT in May 1993 . It made the difference. I would also like to thank all the others who attend the International Breakfast, for their their suggestions as well.

Abstract

The paper is organized to explain the inward foreign direct investment boom, ongoing, in mainland China. The paper lays out the important dimensions of the phenomenon in the section labelled: Descriptive Statistics. The next section constructs a model, based on a proposition that firms, operating under competitive market conditions, arbitrage profit rates between the home and host country, and initiate a disequilibrium investment flow. These profit differentials are determined, primarily, by the underlying macroeconomic labor markets conditions in the home and host country. The final sections test the model's result with classical linear regression techniques, and confirm predictions the model makes about the importance of the wage gap, the degree of labor intensity, the home technology, and the size of home and host markets, in determining the origins and size of direct investments in China, and other economies with similar characteristics.

1 Introduction

In the short span of five years, mainland China has experienced a major boom, in inward foreign direct investment, into unauthorized coastal regions and authorized, coastal Special Economic Zones. The origins of these investments are found, largely, in the so-called newly industrialized countries of Hong Kong, Taiwan, Singapore, and South Korea. These are all small economies, some of which experienced similar, smaller, inward foreign direct investment booms a decade earlier. This paper is organized to explain the China investment boom.

Economists know little about what initiates investment flows to poor countries, particularly those that originate from other, recently poor countries, as is the case with China. They know little about how large the flow might get, or what may cause the flow to end. In fact, the existing literature does not even recognize foreign direct investment as a disequilibrium economic process, which it must represent. This is so simply because foreign direct investment theory does not exist: to predict the origins of booms in inward direct investment, or to explain their magnitudes. The literature on foreign direct investment remains largely an empirical one, with case studies, or tests of the 'traditional' theory of foreign direct investment, that is, tests of the informal conventional wisdom of the previous empirical studies. For an example of the empirical literature, see Moore[1992] on Germany, O'Sullivan[1992] on Ireland, Jeon[1988] on Korea, Lucas[1993] and Hill and Johns[1985] on Southeast Asia, Tsai[1992] on Taiwan, and Wells[1992] on Indonesia. Without formal economic foundations for the

foreign direct investment phenomenon, little appropriable knowledge has been gained about a generalizable, underlying economic process. An unanticipated, accelerating investment movement such as the one ongoing in mainland China only underscores the point.

In keeping with the approach to empirical foreign direct investment studies, this paper explains the movement of capital through the example of one country: China. However, this paper constructs a formal model, which is tested on data appropriate for China, and is generalizable to other regions. Section Two reviews some descriptive statistics on the investment boom in China. Section Three constructs a model of foreign direct investment, one based on a disequilibrium arbitrage motive for firms in competitive markets. Arbitrage is a textbook explanation for capital flow in liquid financial markets: in currency, in bond, and in stock markets. Given widespread acceptance of arbitrage as a principal motive for other international investments, it is surprising that little attempt has been made to find an arbitrage structure for foreign direct investment. This section verifies the utility of the arbitrage motive for foreign direct investment under competitive market conditions. Section Four introduces the methodology and the implications of the econometric test. Section Five examines the fit between the model and the test for the case of China, a test generalizable to other flows which originate from similar underlying economic processes. Section Six concludes with a summary explanation of the economic determinants in the international boom on mainland China, suggests directions for future research,

and discusses implications for other poor regions.

2 Descriptive Statistics

The first statistics to look at relate to the size of the inward investment boom to China, with respect to Gross Domestic Product, and to Gross Fixed Capital Formation. Below are numbers for the period 1990-92.

Table 1: China GDP, Gross Fixed Capital, and Foreign Capital

(1985 billion Yuan)

Year	GDP	GFC	Foreign Capital
1990	1008	373	34
1991	1075	458	41
1992	1122	462	67

Source: China Statistical Annual 1993, International Financial Statistics

In 1992, the amount of foreign capital exceeded 14% of the Gross Capital Formation available to the Chinese economy, and exceeded 5% of Gross Domestic Product. Robert Dernberger reports that for 1928-30, a period where foreign domestic investment was allowed in China, and from which some of the only historical data is available, net private foreign investment accounted for slightly less than 1% of GNP. Contemporary values, then, are a marked improvement

over a long historical time period, covered by Dernberger from 1840-1949. [1] Comparisons across economies yield similar conclusions about the large size and unprecedented vigor of this inward investment. At 19 billion dollars a year in 1992, the China inward direct investment amounts to less than half the inward direct investment placed in the United States, but exceeds inward direct investment in all other individual economies. [2] At 104 billion dollars over twelve years, beginning in 1979, the decadal China investment flow is exceeded, only, by the economy of the United States, at 214 billion dollars, from 1981-88. [3] Given the large set of economies where capital flows are reported, then, this must be seen as a significant amount of inward investment, for either a developed or developing economy. Certainly, for an economy only recently released from communist autarky, an inward flow of this magnitude is unprecedented.

An additional inward flow comparison can be drawn from the experiences of the economies which now are the primary investors in China. This group, the so-called newly industrializing economies (NICs), witnessed a large inward flow in the decade of the 1970s. The table on the following page allows the reader to compare the two experiences, both in the magnitudes, and in their composition between private and public investment.

[1] Dernberger pp.28
[2] using FDI figures for 1988
[3] Graham and Krugman, in Froot p.19

Table 2: NIC Capital Flows and the China Capital Flow

(1985 dollars and percentages)

Economy	1969-71	1972-76	1977-80	1981-83
Hong Kong				
Total	654	410	853	1471
-Official	31	27	2	3
-Private	69	73	98	97
Korea				
Total	1478	1627	1897	1597
-Official	73	66	57	65
-Private	27	33	44	35
Singapore				
Total	220	377	695	1202
-Official	56	34	14	2
-Private	44	66	86	98
Taiwan				
Total	581	490	334	589
-Official	47	42	75	30
-Private	53	58	25	70
Thailand				
Total	562	273	982	1518
-Official	54	75	68	57
-Private	47	25	32	43
NIC total	3495	3177	4761	6377

	1983-85	1986-88	1989-91	1992
China				
Total	9712	21496	21605	12128
-Official	48	71	65	42
-Private	52	29	35	58

Source: OECD, MOFTEC Almanacs.

Again, one notes that the present flows to China are large in magnitude. The flows to China are often 4 to 5 times greater than a sum of flows which entered Hong Kong, Singapore, South Korea, Taiwan, and Thailand in the 1970s. It is also interesting to note that the private investment surges in these countries often reached 98% of the total investment flow. In 1992, China has managed to attain a private investment flow of 58% of the total investment flow. This can mean either the public flow to China has been of an equally large relative magnitude, or, that the private flow to China has yet to dominate the public flow, like it had for the other countries in the sample at an earlier time period.

It is also useful to consider the origins of inward investment, as this information provides clues to the nature of the underlying economic process. On the following page is a table which presents the primary origins of the China capital flow. In addition to approved contracts and utilized capital placed in mainland China, the table also reports a size variable, GDP, a structural transformation variable, manufacturing employment, and a labor market condition variable, the hourly wage. The data for China are appended to the bottom for the ease of direct comparison.

Table 3: Origins of 1992 China-bound Foreign Direct Investment

Region	Approvals (%)	Utiliz (%)	GDP (85 $)	Man.Emp. (%)	Wage (85 $)
NIC's					
Hong Kong	64	68	52	20	2.71
Taiwan	13	10	177	30	4.26
Macau	2	2	27	35	2.71
Singapore	2	1	40	32	4.40
South Korea	1	1	191	26	2.90
Total	82	82	487	-	-
Japan	4	6	3365	24	13.98
USA	7	5	4645	17	8.94
West Europe	1	1	3825		
Germany	-	-	1418	31	11.31
France	-	-	720	21	13.81
UK	-	-	721	28	7.79
Italy	-	-	781	22	8.73
Switzerland	-	-	185	18	13.02
Other	6	7	-	-	-
Total	100	100			
China			204		0.11

Source: IMF, Yearbook of Labor Statistics.

The important message sent by the data is that over four fifths of the inward capital flow originates in the NIC's: Hong Kong, Macau, Taiwan, South Korea, and Singapore, with Hong Kong as the primary investor. These countries are small in comparison to the United States and Japan, with a combined GDP of no more than 11% of the United States. When compared to the GDP of China today, the NIC's cumulative GDP is over two times the size of China. China began to approve investment from Taiwan and South Korea in 1992, implying that the presented distribution is the most current picture of inward flow, but should not be extrapolated backwards. The NIC's also show, with Hong Kong as the exception, a larger manufacturing sector as a percentage of total civilian employment, when compared to the United States and Japan. A final piece of relevant information about the NIC's is provided by the hourly wage data, which show these small manufacturing economies pay lower hourly manufacturing wages than places like Japan or the United States. However, when compared to mainland China wages, the NIC wages are much higher.

Another message sent by the data is the variation in the magnitudes of the inward flow from Japan, the United States, and Europe. The data show three economies, with nearly equal GDPs, comparable manufacturing sectors, and comparable wages, yet the flow from Europe to China is significantly less than the flow from Japan or the United States.

The table on the following page concludes with the destination of the inward flow, by sector. What is clear is that the investment flow is directed towards the manufacturing, or industrial sector, of the Chinese economy, with over four fifths of the reported flow directed to that sector. The approved investments for the agricultural sector is minimal, and approved investments in the human capital intensive sectors, Science and Research, Education, and Communication, is not of a significant level to register in the China approvals and utilization data. It is also true that this investment remains near the coast of China, close to the former treaty ports, or within the Special Economic Zones of China, also on the coast.

For a summary of the descriptive statistics, here are the key facts. The flow is over 14% of the annual gross fixed capital formation in China, a figure unprecedented in China history, large for both developing and developed economies, and much larger than the flows reported during the boom in investment to the NIC's during the 1970's. This flow originates in the NIC's today, which remain small manufacturing cities, or economies. The NIC's have lower wages than economies like Japan, the USA, or Europe, but higher wages compared to China. The investments are then placed in the manufacturing sector in China. These descriptive statistics provide the background for the next section, which constructs a model to explain these facts.

Table 4: Destination of Foreign Direct Investment

Destination	1986 (%)	1987 (%)	1988 (%)	1989 (%)	1990 (%)	1991 (%)	1992 (%)
Industry	68	81	84	88	91	90	79
Real Estate	14	6	4	3	2	3	9
Commerce	4	2	1	1	1	2	3
Building	2	1	1	1	1	1	2
Agriculture	5	4	4	3	3	3	2
Communication	1	2	2	3	1	1	1
Science & Res	0	0	0	0	0	0	0
Education	0	0	0	0	0	0	0
Hygiene	0	0	0	0	0	0	0
Finance	0	0	0	0	0	0	0
Other	4	2	2	2	1	1	2
Total	100	100	100	100	100	100	100

Source: China MOFTEC Almanacs

3 The Model

A model of international profit arbitrage, under competitive market conditions, can be constructed from the following logical relationships. Many of the connections proposed follow from standard assumptions in the interest rate arbitrage literature of international finance, and in the static optimization structures of microeconomics. The novel result derives from combining these two sets of logical relationships, to form a single reduced form equation, which can tie foreign direct investment to its underlying microeconomic and macroeconomic determinants. Such a solution illuminates a portion of international direct investment as a disequilibrium capital movement, initiated by firms arbitraging profit rates; arbitrage found by manufacturing operations which face different budget constraints in a portfolio of existing and potential country locations. Such a set of conditions seems appropriate for explaining the ongoing direct investment boom in the coastal provinces of China, and is generalizable to a larger set of direct investment movements, specifically those initiated by firms attempting, or compelled, to arbitrage profit, under competitive market conditions, by shifting labor intensive production to economies at an earlier stage in the development process.

To begin, consider a foreign direct investor, one who must produce an amount of output, denoted X. This investor is constrained to choose between two locations, and, therefore, faces two budget constraints in two countries, one denoted home, and the other denoted host, or foreign. The variables found in home will

not carry a subscript, while the variables found in host, or foreign, will carry the subscript f. The nominal rates of return to the factors of production are then represented by r and r_f for the nominal returns to capital, and, w and w_f for the nominal returns to labor.

$$rK + wL = PX \tag{1}$$

$$r_f K + w_f L = P_f X \tag{2}$$

Assume the investor must produce the amount of output X with fixed coefficients technology, and, the limiting input to production is the input, capital. That is, this investor cannot substitute between capital and labor in the production of output, X, and capital remains the scarce input. Capital is also differentiated from labor as the input which earns the investor a return. Technology, represented by the coefficient, a, then becomes a measure of the effectiveness of capital in producing the demanded output.

$$X = min\left\{\frac{K}{a}, \frac{L}{b}\right\} \qquad s.t. \quad X = \frac{K}{a} \tag{3}$$

Assume arbitrage exists between the real profit rates in the home and host country, where R and R_f represent real rates of return. This disequilibrium condition is brought about by government, which forbids the movement of labor across borders to equalize rates of return, and by firms, which own capital

capable of being shifted to new geographic locations. The condition is nearly identical to the interest rate arbitrage equation found in international finance. With this condition, capital flow will cease when the returns to capital are equal across the two countries.

$$\frac{\dot{K}}{K} = R_f - R \tag{4}$$

Assume purchasing power parity holds across the two countries, so no incentive exists for agents to price arbitrage in the goods market. Let e be the home currency price for a unit of foreign currency.

$$P = eP_f \tag{5}$$

Assume the total demand for the good, Y_{tot}, is in equilibrium with the supply, X. Assume that the industry configuration is competitive, that is, efficient scale is achieved at a position on the cost curve where many identical firms produce exactly the same amount of undifferentitated output, and entry and exit is costless.

$$Y_{tot} = X \tag{6}$$

Assume individual firm output is correlated directly with the size of the macroeconomic market, and the amount demanded of the good, Y_{tot}, is the sum of both home and host consumer demand. That is, no barriers to trade exist, consumer

tastes are homogeneous across countries, and transportation cost is an insignificant component of total production cost.

$$Y_{tot} = Y + Y_f \tag{7}$$

This closes the model.

The following algebraic exercise will conclude with the desired reduced form equation. Equate output in the two budget constraints, introduce the purchasing power parity relation, and shuffle terms.

$$\text{let } \frac{r}{P} = R \qquad \text{let } \frac{w}{P} = W$$

$$\text{let } \frac{r_f}{\frac{P}{e}} = R_f \qquad \text{let } \frac{w_f}{\frac{P}{e}} = W_f$$

$$\rightarrow (R - R_f)K = (W_f - W)L \tag{8}$$

Substitute in the profit arbitrage equation and the goods equilibrium conditions, and a multiplicative, reduced form, foreign direct investment equation is derived.

$$\dot{K} = (W - W_f)la(Y + Y_f) \qquad let \quad l = \frac{L}{K} \tag{9}$$

$$\tag{10}$$

Consider some of the properties of this relation. Direct investment will be greater, the larger the gap between wages in the home and host country. If one

country, call it home, is increasing labor demand as a result of a labor-intensive industrialization push, then the wage in this country will begin to rise. As the gap widens, the incentive to profit from the difference in wage costs increases, and firms in competitive sectors of the economy will invest in the host country to arbitrage the wage gap. Another property of the relation is that the wage gap arbitrage incentive is greatest in industrial sectors where the ratio of labor to capital, or the labor intensity, is highest. This is often exhibited in the development process by the early appearance of textile firms, as this industry requires a large quantity of unskilled wage labor relative to capital invested. In China, textiles has meant apparal, shoes, stuffed toys, leather goods, and simple electronic assembly. [4] Labor intensity, together with the wage gap term, then compose what can be defined as the supply determinants of direct investment.

The remaining terms, the technology coefficient, a, and output, $Y+Y_f$, arrive from what can be defined as the demand determinants of direct investment. These variables originate not directly from the arbitrage process, but from the investment requirements which follow from the necessary production of a fixed amount of output. The technology in the model connects the amount of capital required to produce a fixed amount of output: If firms in an economy have a low level of technology, this will mean a high coefficient, a. These firms then must supply a greater amount of capital to produce a fixed amount of output. Therefore, capital flow will be greatest from economies where the level of tech-

[4] US Dept. of Commerce 1993

nology is lowest. The output term, $Y + Y_f$, will also be associated with higher capital flow, as the larger the amount of output demanded, given fixed technology, the greater amount of capital required to produce the demanded good. Since tastes are considered homogeneous across countries, it is not important if demanded output originates in the home or host country. What will matter is the summed demand, available to each firm, in both economies. Blocked export trade from a host country, would then be expected to reduce capital flow, to the amount required to serve the host, but not the home, country. In the case of China, it may be necessary to add a third-country term to the output demand equation, as the off-shore NIC manufacturing firms often export to the USA. This addition would also increase the capital flow.

The multiplicative form is meaningful. Such a form implies that both the demand and supply determinants are necessary for capital flow. Existing wage gaps, with blocked two-way trade, will not produce a disequilibrium capital flow. Existing wage gaps between countries with small markets will produce a small capital flow. Large final goods markets also produce no capital flow without existing wage gaps. Other similar corollary statements exist for the conclusion.

Within the competitive markets, disequilibrium capital flow presented above, in equation (9), there can be found numerous ways for government to intervene in the market process of arbitrage, in an attempt to increase or inhibit the investment flow. Exchange rate interventions and tariffs can be included in the denominator of the host real wage variable. Depreciations and low tariff rates

will reduce the host real wage and increase the flow of arbitrage investment. The technology term can be manipulated by approving or denying licenses and joint ventures to transfer technology. The model predicts that technology transfers, acting as a substitute for foreign capital, will reduce capital flow. The final good markets term can be adjusted as well, with quotas and export licenses, reducing market access. In a unique policy, the China government has also imposed a firm specific hard currency constraint, which requires all foreign firms to earn hard currency through export in order to pay for the further movement of capital into China. The effect of this constraint on the disequilibrium investment process has been to reduce the value of the host output term, retaining domestic markets for domestic firms, and to increase the value of the home output term, where hard currency can be earned. All of these policies can be designed, individually or in combination, to influence the arbitrage process, and have been applied, both within China and elsewhere.

The next two sections test the formal arbitrage proposition with classical linear econometric techniques. This approach will confirm or reject the predictive power of the model, and provide insight into the underlying economic process behind one important contemporary event, the direct investment boom in mainland China. Section four opens with a review of the methodology, the sequence of regressions, the sample combinations, and the expected signs for the regression coefficients. Section five reviews the results.

4 Methodology and Implications

In the regressions which follow in section five, the following assumptions [5] have been made to produce a specification for OLS multiple regressions. In matrix form,

$$\mathbf{Y} = \mathbf{X}\beta + \epsilon \tag{11}$$

in which

$$\mathbf{Y} = \begin{bmatrix} Y_1 \\ Y_2 \\ \cdots \\ Y_n \end{bmatrix} \quad \mathbf{X} = \begin{bmatrix} 1 & X_{21} & \cdots & X_{k1} \\ 1 & X_{22} & \cdots & X_{k2} \\ \cdots & \cdots & \cdots & \cdots \\ 1 & X_{2N} & \cdots & X_{kN} \end{bmatrix} \quad \beta = \begin{bmatrix} \beta_1 \\ \beta_2 \\ \cdots \\ \beta_k \end{bmatrix} \quad \epsilon = \begin{bmatrix} \epsilon_1 \\ \epsilon_2 \\ \cdots \\ \epsilon_N \end{bmatrix} \tag{12}$$

where $\mathbf{Y} = \mathbf{N} \times \mathbf{1}$ column vector of dependent variable observations

$\mathbf{X} = \mathbf{N} \times \mathbf{k}$ matrix of independent variable observations

$\beta = \mathbf{k} \times \mathbf{1}$ column vector of unknown parameters

$\epsilon = \mathbf{N} \times \mathbf{1}$ column vector of errors

Each component $\mathbf{X_{ij}}$ has two subscripts, i for the column, and j for the row.

[5] drawn from Pindyck and Rubinfeld p.94

Each column of $\mathbf{X_{ij}}$ represents a vector of N observations on a given variable. In the regressions that follow, N will equal 10 for individual country regressions, 43 or 45 for the Europe sample, and 104 for the Total sample. All observations will be associated with an intercept of 1. In addition, the elements of $\mathbf{X}$ are fixed and have finite variance, and the rank of $\mathbf{X}$ is k, which will be from 3 to 7, but never greater than 10, the minimum number of observations. $\log \epsilon$ is normally distributed, with $E(\log \epsilon) = \mathbf{0}$ and $E((\log \epsilon \log \epsilon')) = \sigma^2 \mathbf{I}$, where $\mathbf{I}$ is an $N \times N$ identity matrix. This is identical to assuming that the variance-covariance matrix is zero in its off-diagonal elements. What will be reported in the charts which follow will be the β matrix of marginal coefficients.

To put the multiplicative reduced form equation (9) into the multiple regression matrix form, described above, the multiplicative arbitrage variables must be transformed, by a logarithmic operation, into an inherently linear equation with additive terms. This will allow regressions of the natural log of direct investment on the natural logarithms of its determinants. A log on log regression reports elasticity measures in the β matrix, so the coefficient measures the percentage change in the dependent variable for a one percent change in the independent variable. In addition, it is necessary to assume that the error term ϵ is lognormally distributed, so its logarithm is normally distributed.

$$\dot{K}_i = (W_i - W_{fi}) l_i a_i (Y_i + Y_{fi}) \epsilon_i \qquad i = 1 \ldots N \quad (13)$$

$$\log \dot{K}_i = \log(W_i - W_{fi}) + \log l_i + \log a_i + \log(Y_i + Y_{fi}) + \log \epsilon_i \quad i = 1 \ldots N \; (14)$$

This additive equation can then be used to test the arbitrage proposition using Ordinary Least Squares regression techniques. The dependent variable is equal to the natural logarithm of the capital flow. It is denoted either APPFDI, for the approved contracts data, which acts as a convienient proxy for capital flow, or UTILFDI, for the utilization data, which is the actual amount of capital placed in China by foreign firms. APPFDI contains more data than UTILFDI. The independent variables are: the natural logarithms of the wage gap, denoted WAGEGAP, labor intensity, denoted LABOR, technology, denoted TECH, and an additive markets term, denoted TOTGDP. In regressions which test wages and GDP separately, the China wage is denoted CHINWAGE, the home wage is denoted HOMWAGE, the China GDP is denoted CHINGDP, and the home GDP is denoted HOMGDP.

In the above multiple regression, the expected signs on the beta coefficients of the model are as follows: The WAGEGAP coefficient should be positive, as the larger the spread between hourly wages, the greater the profits from location arbitrage. This variable has been estimated on hourly wages in manufacturing for both the home and host country. Both values are expressed in 1985 US dollars, as are all the other variables in the regressions. The LABOR coefficient should be positive as the greater the labor intensity of the firm, the greater the profits to made from relocating abroad. Ideally, this variable would come from

firm level data, but this data is not available. The data used is country level data on the ratio of civilian non-agricultural employment over the economywide Gross Fixed Capital. The TECH coefficient should also be positive, as the less technology available to a firm, the more capital needs to flow to serve demand. It also should be estimated at the firm level, but the data are not available. Instead, the ratio of Gross Fixed Capital Formation over Gross Domestic Product is used instead. The TOTGDP coefficient should also be positive, as larger markets will require more capital.

In the second, third, and fourth set of regressions, the model is parsed into the supply determinants and the demand determinants. This will allow an decomposition of the variation explained by the two sets of variables. If profit arbitrage under competitive markets is the main motive of firms investing in China, the supply determinants will explain more of the variation. If the market size is the attactive variable, then the demand determinants will explain more of the variation. For these regressions, the following signs on the coefficients are expected: The HOMWAGE- expected to be positive, the CHINWAGE- expected to be negative, LABOR- expected to be positive, HOMGDP- expected to be positive, CHINGDP- expected to be positive, and, finally, TECH- expected to be positive. A final set of regressions combines the two sides of the market and regresses all the variables as one set of explanatory variables.

The regressions are then a mixture of microeconomic variables, labor intensity and the technology available to the home firm, and macroeconomic vari-

ables, the wage levels in the home and host country, and the size of the markets. The regressions which follow introduce some error as a result of using macroeconomic country level data for microeconomic firm level data, yet the results prove to be robust to the change. In addition, the coefficients are reported for samples identified with countries, and with one region. This accounts for the bulk of the investments placed in China. They are: Hong Kong, Singapore, Japan, USA, Germany, and Europe. As a final regression, all the individual samples were pooled and a Total regression run. This will allow the individual country arbitrage hypothesis to be compared to the aggregated data set. For this data set, the model makes no *a priori* predictions.

5 Empirical Results

The first set of regressions is the approved contracts and the utilized capital invested in China. At a country level, the amount of variation explained is very high, anywhere from 72% to 96% of the total variation for the approved contracts. For utilized capital, the amount of variation explained varies from 30% for the USA, 46% for Germany, 68% for Japan, and a high of 76% for Hong Kong, not a spurious pattern, perhaps. The signs are correct for Hong Kong approvals, but the signs are opposite for utilization. All variables fail to be statistically significant at a 5% level. It is interesting to note the similarity Hong Kong has with Singapore, with high elasticities on wages, and low elasticities

on markets, and the dissimilarity Hong Kong and Singapore have with Japan, the USA, and Germany, with negative elasticities on wages and high, positive elasticities on markets.

In the aggregate data, all variables are statistically significant, but the variation explained drops to 27% and 32%, respectively. The expected signs are reversed in the Total sample, except for the markets term. This may mean the markets term is a valuable explanatory variable for the entire sample, but that only the low wage NICs register a correct wage arbitrage term, while the high wage counties register the opposite sign. One explanation for this pattern is this: high wage countries have long since lost the mobile capital associated with labor-intensive manufacturing industries in an earlier iteration of the ongoing arbitrage-development process. This leaves the disequilibrium flow to occur between those with formerly global minimum wages, but with wages which are now rising, displacing manufacturing to sites where costs are at a present global minimum.

The next two sets of regressions separate the demand determinants from the supply determinants. Note that the Total regression explains 3% or 12% of the variation on the demand side, compared to 22% or 38% on the supply side. This evidence favors the hypothesis that a supply side arbitrage motive is behind the capital flow. The signs for the China wage are correct for nearly all the regressions, while again, we see that the low wage countries show the correct sign on home wages and the high wage countries show an incorrect sign;

more evidence for the hypothesis that the disequilibrium is present only in the low wage countries. This also lends support to Robert E. Lucas's query into 'Why Capital Doesn't Flow From Rich to Poor Countries'[6]. Note that the home markets term is positive in each sample, but the China markets term is negative. This might suggest something perverse is going on, but that is not true. The Chinese government has just been devaluing the Yuan, to keep wages on a downward movement (and at a lower level than even Indonesia!), faster than the domestic economy GDP has expanded. Factoring out this effect would then give the correct sign. The labor intensity term does not show a discernable pattern in these regressions. All of the R-squared terms are high at the individual country level, again. The statistical significance is spotty, again, and is best examined first-hand for any identifiable patterns. In summary, the supply side determinants explain greater variation than demand side determinants, particularly for the low wage countries. High wage countries seem to be motivated more by the total markets term.

The final set of regressions is a sum of the second and third set of regressions. It can be seen to be a more 'traditional' analysis, without an explicitly derived microeconomic structure. Note that the explained variation is very high for all the variables. In addition, the signs are correct for all the individual country samples. The exception, again, is the home wage for high wage countries, who exhibit a negative sign for high wages. The technology term is the correct

[6]AEA Paper and Proceedings 1990

sign. At an individual level, there are statistically significant variables for Hong Kong and Germany only. All variables are statistically significant in the Total sample. In the Total sample, earlier explanations hold for the observed signs. A negative home wage term implies arbitrage is a solid motive for only low wage countries, where the bulk of the China capital originates. A negative China wage suggests that the government policy of systematic devaluation is effective in attracting foreign capital. The negative labor intensity coefficient suggests that, like the wages, the arbitrage assumption is correct for those economies at early stages of development, with lots of 'footloose' manufacturing, but is not useful for economies where arbitrage took place, long ago. The Tech coefficient exhibits a pattern similar to the Labor coefficient, and, probably, for the same structural transformation reasons. Technology is poor in NIC's and better in countries like Japan and the USA. Therefore, capital flow is relatively greater from the NIC's. The home markets term is positive, but the elasticity measure is a fraction of the wage elasticities. This is supportive of the earlier dominance given to the supply determinants over the demand determinants in explaining disequilibrium capital flow.

In summary, econometric results confirm that the model is effective for explaining capital flow as a disequilibriuim arbitrage process, from the low wage countries to the lowest wage country, but not from the high wage countries to the lowest wage country. These two results are consistent with the hypothesis, on deeper reflection about the longevity of disequilibrium in sectors where capital

is highly mobile. In addition, the amount of variation explained by supply determinants is much greater than that explained by demand determinants. This is also supportive of the arbitrage motive. And finally, the amount of explained variation is much greater at a disaggregated, individual country level than at an aggregate level, also adding evidence to a bilateral arbitrage motive, and not to an aggregate movement with vague economic determinants.

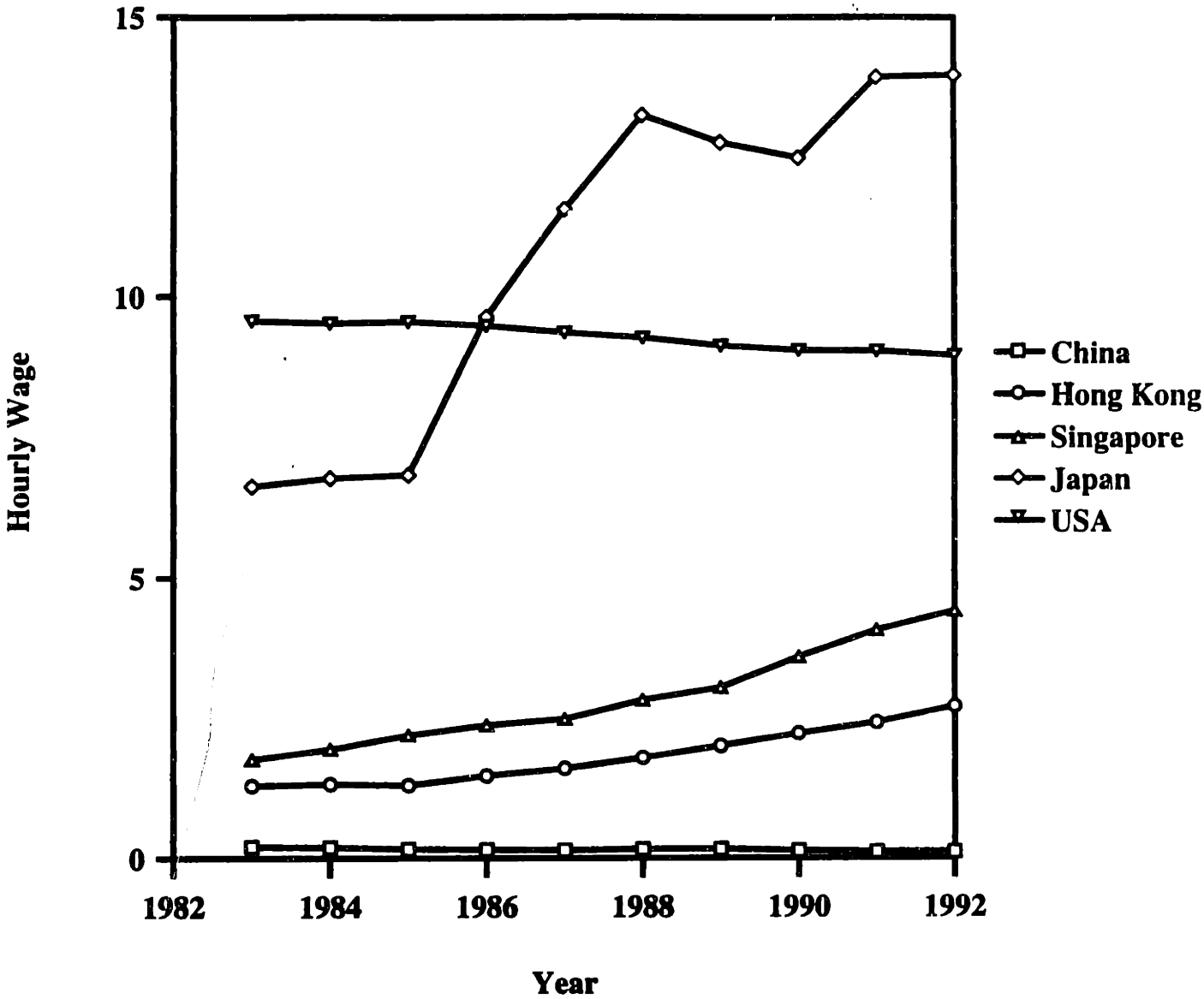
6 Conclusion

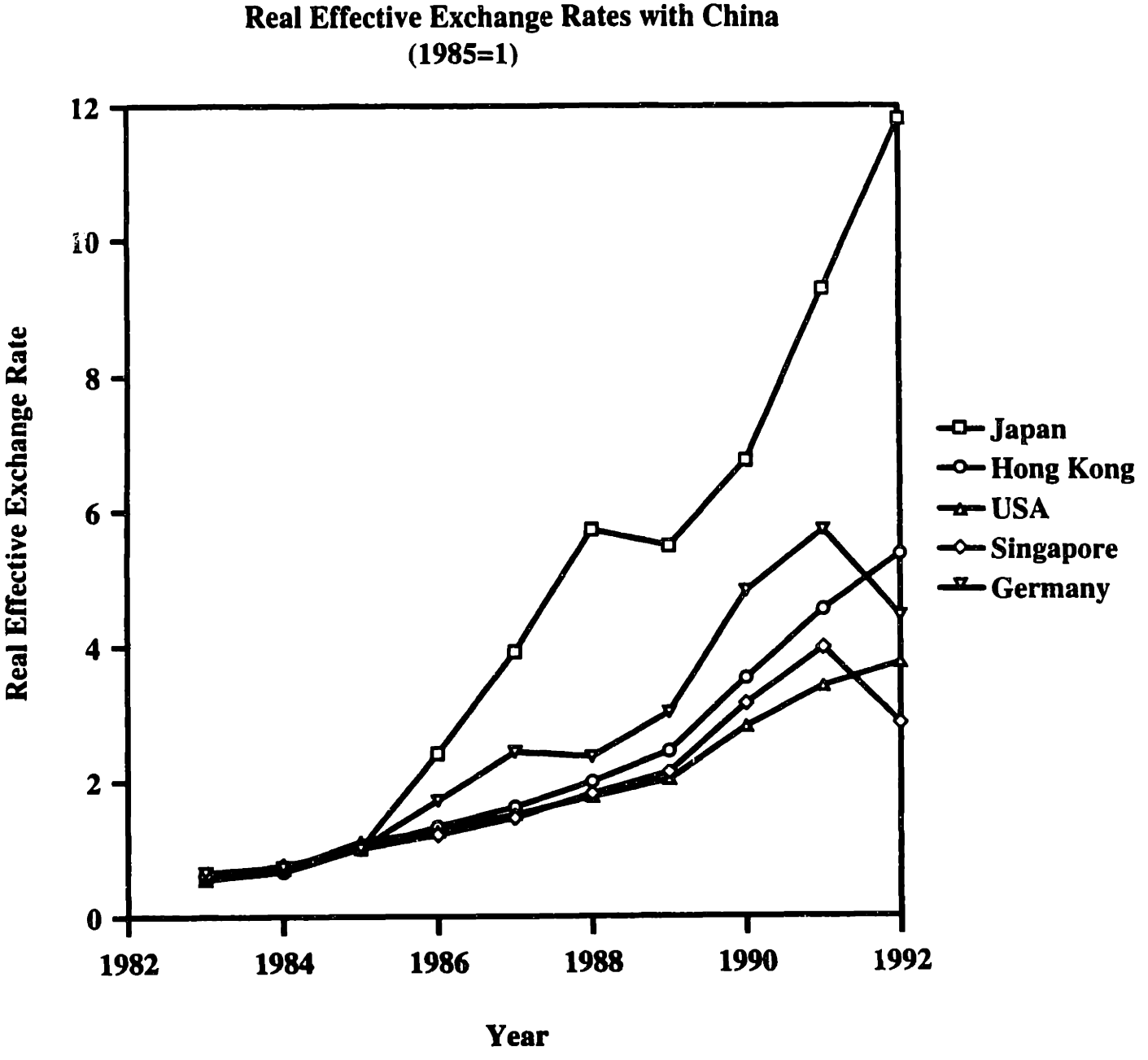
Descriptive statistics began this paper about the ongoing investment boom in coastal mainland China. These facts led to a model which could explain the facts, based on an arbitrage motive in competitive markets. The arbitrage motive, in following sections, was proven to be largely confirmed by standard regression techniques. The regressions confirm that low wage countries, with present arbitrage potential, is where investments originate, not high wage countries. In addition, supply side deteminants dominate demand side determinants in explaining more of the variation in the investment flow. The signs on the labor intensity and technology terms also confirm this result. And, finally, the cumulative markets term is of the correct sign for almost all the regressions.

A chart on the following page shows a time series of hourly wage rates for important members in the sample of countries who invested in mainland China. The chart also includes the hourly wage rate in China. This picture confirms,

and concludes that an increasing wage gap between the NIC's and China has been behind the flow of investment capital. On the page following, is a chart of real effective exchange rates, for the same set of countries, where 1985 is set equal to one for the ease of cross country comparison. This graph identifies that part of the wage gap exhibited in the data can be explained by the actions of government in the home and host countries, on the level of the exchange rate. The China government systematically devalued the Yuan against the Dollar throughout the period 1983-1992, to insure mainland China remains the lowest wage economy in the region. In addition, the Plaza Accord of 1985, between major industrial countries, put added upward pressure on the Yen. However, since Japan was already a capital intensive high wage country to begin with, the effect on the China flow has not been significant. The Net effect on all investing countries was a real appreciation against the Yuan, boosting the level of already rising hourly wages.

Hourly Wages in Manufacturing 1983-1992
(1985 US $/hr.)




Real Effective Exchange Rates with China
(1985=1)
Real Effective Exchange Rate
12
10
8
6
4
2
0
1982
1984
1986
1988
1990
1992
Year
Japan
Hong Kong
USA
Singapore
Germany

The chart on the following page concludes with a snapshot of the effect of the boom on the economic structure of Hong Kong, to emphasize the implications this process has had on economies outside mainland China. The effect has been to expand the finance, retail, and export-import sectors of Hong Kong and to shrink the size of the manufacturing sector. In 1992, the Hong Kong economy had a manufacturing sector comparable to Switzerland, and smaller than the manufacturing sector in Japan. This concludes the paper.

Future research will examine the portion of capital flow not discussed in the paper, namely, the foreign government credit flow. The governments of Japan and France, along with others, and the World Bank, lent large sums of capital to the China government, for spending on infrastructure projects: ports, power plants, roads, and railroads. No research exists on the role this credit played in the China investment boom, and in booms in other parts of Asia. And, finally, a more rigorous study needs to be made of the role the China government has had in encouraging and constraining the boom. This could add greater precision to understanding the role of government in managing an investment boom.

What does the arbitrage model imply for other regions outside Asia? It means potential investors in post-communist Russia are now being created in Poland, Czechoslovakia, and Hungary. It means Spain may, someday, develop manufacturing in Morocco, and Mexico, someday, may develop manufacturing in the poor Central American economies bordering it. It means sub-Saharan African countries should keep close ties with South Africa. And it means China,

someday, may be the primary investor in Vietnam and Cambodia.

Table 5: Hong Kong Structural Transformation 1987-1992

Industry	1987 (%)	1992 (%)	% Change
Manufacturing	32	20	-34
Finance, Insurance, Real Estate, etc.	8	11	45
Wholesale, Retail, Import/Export, etc.	24	33	33
Building & Construction	2	2	-12
Other	34	34	2
Total	100	100	-

Source: Hong Kong Monthly Digest of Statistics

Table 6: Dependent Variable is Approved FDI Contracts

(t-statistics in parentheses)

IndVar	HKong	Sing	Japan	USA	Germany	Europe	Total
C	-20.58 (-0.13)	-129.98 (-1.95)	-420.84 (-3.14)	-308.25 (-1.43)	-49.56 (-0.24)	-8.37 (-1.08)	26.26 (4.15)
WageGap	4.20 (0.82)	9.63 (3.01)	-19.47 (-5.81)	-8.49 (-0.14)	-22.36 (-1.60)	0.79 (1.84)	-2.42 (-5.43)
Labor	2.28 (0.18)	9.63 (2.12)	15.40 (2.36)	20.46 (1.26)	-6.38 (-0.60)	0.52 (0.80)	-1.99 (-3.84)
Tech	3.29 (0.24)	9.21 (1.89)	1.76 (0.59)	14.85 (0.72)	-7.58 (-0.65)	-0.13 (-0.05)	-2.42 (-1.96)
TotGDP	0.51 (0.13)	3.45 (0.98)	38.70 (4.46)	13.51 (1.38)	22.91 (1.24)	0.40 (0.72)	0.39 (1.39)
R^2	0.77	0.89	0.96	0.89	0.72	0.12	0.27
N	10	10	10	10	10	45	104

Table 7: Dependent Variable is Utilized FDI Contracts

(t-statistics in parentheses)

IndVar	HKong	Sing	Japan	USA	Germany	Europe	Total
C	44.05 (0.54)		-77.85 (-0.43)	-20.08 (-0.16)	199.37 (0.43)	-5.59 (-0.62)	20.03 (3.79)
WageGap	0.30 (0.10)		-4.67 (-1.02)	6.63 (0.19)	14.58 (0.51)	0.12 (0.25)	-2.08 (-5.64)
Labor	-2.91 (-0.43)		2.38 (0.27)	1.99 (0.21)	-4.58 (-0.21)	0.53 (0.67)	-1.54 (-3.56)
Tech	-3.95 (-0.52)		-0.96 (-0.23)	-0.07 (-0.01)	11.50 (0.48)	-0.25 (-0.07)	-1.67 (-1.56)
TotGDP	-1.09 (-0.49)		8.54 (0.72)	-1.53 (-0.27)	-21.71 (-0.58)	0.25 (0.39)	0.61 (2.62)
R^2	0.76		0.68	0.30	0.46	0.09	0.32
N	10		10	10	10	43	94

Table 8: Dependent Variable is Approved FDI Contracts

(t-statistics in parentheses)

Indvar	HKong	Sing	Japan	USA	Germany	Europe	Total
C	-6.06 (-0.28)	10.56 (0.52)	29.54 (1.13)	-66.41 (-1.63)	-1.06 (-0.04)	23.71 (3.4)	37.72 (3.79)
Tech	3.98 (0.68)	-1.89 (-0.76)	8.40 (1.46)	-5.54 (-1.85)	8.98 (1.47)	-1.40 (-1.34)	1.12 (1.23)
HomGDP	6.28 (2.75)	2.33 (2.09)	0.37 (0.31)	8.08 (1.98)	1.54 (1.25)	0.14 (0.76)	-0.07 (-0.41)
ChGDP	-0.72 (-0.25)	-2.84 (-0.90)	-3.05 (-1.14)	-1.14 (-0.43)	1.38 (0.42)	-4.46 (-3.65)	-5.82 (-3.20)
R^2	0.74	0.76	0.74	0.86	0.58	0.28	0.12
N	10	10	10	10	10	45	105

Table 9: Dependent Variable is Utilized FDI

(t-statistics in parentheses)

Indvar	HKong	Sing	Japan	USA	Germany	Europe	Total
C	1.52 (0.14)		7.25 (0.49)	48.32 (2.73)	37.21 (0.99)	3.02 (0.36)	3.88 (0.42)
Tech	0.66 (0.23)		1.12 (0.35)	-0.37 (-0.28)	1.59 (0.18)	-2.47 (-1.78)	1.25 (1.43)
HomGDP	2.98 (2.67)		0.66 (0.99)	-3.89 (-2.19)	0.99 (0.56)	-0.11 (-0.47)	0.00 (-0.05)
ChGDP	-0.81 -0.56		-0.96 (-0.64)	-1.95 (-1.71)	-7.04 (-1.48)	-0.58 (-0.39)	0.41 (0.24)
R^2	0.78		0.65	0.49	0.60	0.08	0.03
N	10		10	10	10	43	94

Table 10: Dependent Variable is Approved FDI

(t-statistics in parentheses)

Indvar	HKong	Sing	Japan	USA	Germany	Europe	Total
C	6.72 (0.11)	-22.62 (-0.38)	139.79 (3.18)	66.79 (0.89)	153.13 (1.79)	-10.11 (-2.97)	12.98 (3.03)
HomWage	2.94 (1.15)	3.82 (1.61)	-11.15 (-2.94)	-31.32 (-2.02)	-9.52 (-1.59)	0.41 (1.21)	-1.60 (-6.08)
ChWage	-1.02 (-0.47)	-0.92 (-0.32)	-2.25 (-1.98)	-2.28 (-1.28)	0.48 (0.20)	-3.30 (-5.19)	-4.44 (-5.20)
Labor	-0.18 (-0.04)	1.80 (0.83)	-10.07 (-3.24)	0.33 (0.08)	-10.91 (-1.82)	0.44 (2.02)	-1.21 (-4.00)
R^2	0.78	0.81	0.88	0.87	0.63	0.45	0.38
N	10	10	10	10	10	45	104

Table 11: Dependent Variable is Utilized FDI

(t-statistics in parentheses)

Indvar	HKong	Sing	Japan	USA	Germany	Europe	Total
C	0.33 (0.01)		36.20 (1.05)	-52.10 (-1.29)	-63.91 (-0.51)	-3.95 (-0.82)	20.61 (4.61)
HomWage	1.40 (0.99)		-2.20 (-0.74)	13.36 (1.60)	3.59 (0.42)	0.10 (0.22)	-1.41 (-5.08)
ChWage	-0.97 (-0.81)		-0.83 -0.92)	-0.49 (-0.50)	-6.69 (-1.96)	-0.45 (-0.52)	0.13 (0.15)
Labor	0.35 (0.13)		-2.41 (-0.98)	2.26 (1.00)	3.94 (0.46)	0.49 (1.57)	-1.16 (-3.63)
R^2	0.75		0.69	0.30	0.65	0.09	0.22
N	10		10	10	10	43	94

Table 12: Dependent Variable is Approved FDI Contracts

(t-statistics are in parentheses)

IndVar	HKong	Sing	Japan	USA	Germany	Europe	Total
C	-945.25 (-1.32)	-230.26 (-2.36)	-271.41 (-1.65)	308.36 (0.50)	-256.53 (-1.01)	-106.89 (-5.55)	-72.13 (-2.31)
HomWage	5.92 (1.08)	11.46 (1.63)	-16.65 (-3.03)	-130.27 (-0.98)	-33.44 (-1.69)	0.23 (0.86)	-3.08 (-7.72)
ChWage	-12.67 (-1.6)	43.93 (1.54)	-5.16 (-1.61)	-12.20 (-1.14)	-8.64 (-1.30)	-11.07 (-6.65)	-12.56 (4.70)
Labor	62.93 (1.22)	43.50 (1.53)	8.39 (1.05)	9.94 (0,51)	-0.51 (-0.04)	0.72 (1.72)	-2.35 (-5.86)
Tech	87.58 (1.22)	28.95 (2.11)	4.44 (1.16)	27.97 (1.08)	-9.02 (-0.86)	0.22 (0.82)	-3.42 (-3.39)
HomGDP	43.53 (1.15)	31.08 (1.47)	22.80 (2.07)	-19.40 (-0.64)	31.68 (1.39)	0.46 (1.96)	0.20 (1.31)
ChGDP	18.55 (1.68)	-51.17 (-1.45)	7.81 (1.81)	10.79 (1.03)	16.06 (1.83)	14.03 (4.82)	14.63 (3.06)
R^2	0.88	0.94	0.96	0.93	0.86	0.68	0.51
N	10	10	10	10	10	45	104

Table 13: Dependent Variable is Utilized FDI

(t-statistics are in parentheses)

IndVar	HKong	Sing	Japan	USA	Germany	Europe	Total
C	-783.90 (-3.21)		-135.21 (-0.61)	201.50 (0.67)	-817.66 (-2.52)	-13.10 (-0.35)	28.36 (0.83)
HomWag	2.54 (1.37)		-6.54 (-0.87)	-41.29 (-0.64)	-48.72 (-1.92)	0.03 (0.068)	-2.44 (-5.96)
ChWag	-5.32 (-1.99)		-0.64 (-0.15)	2.42 (0.47)	-9.29 (-1.09)	-1.19 (-0.38)	-0.13 (-0.05)
Labor	54.73 (3.13)		5.24 (0.48)	2.45 (0.26)	28.02 (1.90)	0.42 (0.50)	-1.82 (-4.41)
Tech	77.37 (3.15)		0.75 (0.14)	6.75 (0.33)	-7.72 (-0.58)	-0.75 (-0.21)	-2.30 (-2.17)
HomGDP	42.65 (3.31)		11.52 (0.77)	-10.06 (-0.67)	72.63 (2.50)	0.08 (0.19)	0.26 (1.62)
ChGDP	8.48 (2.25)		1.63 (0.28)	-5.85 (-1.13)	11.49 (1.03)	1.29 (0.23)	-0.53 (-0.10)
R^2	0.95		0.75	0.66	0.89	0.09	0.31
N	10		10	10	10	43	94

Table 14: Appendix

Data Definitions and Sources

Name	Description
HomWage	Natural logarithm of the real 1985 US dollar denominated Hourly wages in manufacturing. Annual frequency. Source: *Yearbook of Labor Statistics* and *The Economist Intelligence Unit Annual Report*for Hong Kong, Macau, Taiwan, and Indonesia, 1993-94. Source for the deflator: *International Financial Statistics* and *EIU 1993-94 Country Report* for Hong Kong
ChWage	Natural Logarithm of the real 1985 US dollar denominated Hourly wages in manufacturing. Annual frequency. Source: *Yearbook of Labor Statistics.*
WageGap	Natural logarithm of HomeWage subtracted from ChinaWage. Annual frequency
Labor	Natural logarithm of the ratio of civilian non-agricultural employment over the level of real 1985 US dollar denominated Gross Fixed Capital Formation. Annual frequency. Source: Employment from *Yearbook of Labor Statistics* and Capital Formation from *International Financial Statistics*
Tech	Natural logarithm of the ratio of real 1985 US dollar denominated Gross Fixed Capital Formation over the real 1985 US dollar denominated Gross Domestic Product. Annual frequency. Source: *International Financial Statistics*, Hong Kong and Taiwan numbers from *Alwyn Young: Lessons from the East Asian NIC's: A Contrarian View.*
HomGDP	Natural logarithm of the real 1985 US dollar denominated Gross Domestic Product. Annual frequency. Source: *International Financial Statistics.* Hong Kong numbers from *EIU Country Report 1993-94.*

Table 15: Appendix(cont.)

Data Definitions and Sources

ChGDP	Natural logarithm of the real 1985 US dollar denominated Gross Domestic Product. Annual Frequency. Source: International Financial Statistics.
TotGDP	Natural logarithm of the sum of HomeGDP and ChinaGDP. Source: As listed above for Home GDP and ChinaGDP.
AppFDI	Natural logarithm of approved FDI contracts recorded by the Chinese Ministry on Foreign Trade and Economic Cooperation (MOFTEC). Annual frequency. Source: The Almanac on China's Foreign Economic Relations and Trade 1984-1994.
UtilFDI	Natural logarithm of the real 1985 US dollar denominated utilized FDI recorded by MOFTEC. Annual frequency. Source: The Almanac on China's Foreign Economic Relations and Trade 1984-1994.
Europe	Germany, Italy, UK, France, Switzerland. Numbers assembled from the MOFTEC almanac.

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Chapter Two:

From Subsidies to Profits in an Unstable Two Sector Model of Transition

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Abstract

This chapter studies socialist subsidies, in a two sector production macroeconomy, under disequilibrium transition from the command system. Facts on output growth in two production sectors, the old state and new private sector, show the output collapse generated after the command system in East Europe and Russia. Evidence is also presented for the critical assumption that authoritarian politicians used state subsidy to control the production of output. This state production drive led to the placement of excess capital in the state sector, and to corresponding inefficient unit capital requirements. For purposes of regime stability, politicians also demanded inefficient unit labor requirements from the state firms. The model organizes and explains the facts as measures produced by a market economy under dynamic disequilibrium adjustment from distorted initial conditions. The reinvestment of profits determines the speed and success of the economic transition. The strong result predicts, in the limit, the initial capital allocation would allow the state sector to ultimately serve all demand. Under the market, the probable cause of collapsed output is the uselessness of many state goods; and the *fait accompli* economic transmission into collapsed prices, collapsed profits, collapsed investment, and the sudden shedding of labor, as the final indictment of state production. Economic policy is also discussed.

1 Introduction

A market system claims to organize production with the decentralized instruments of incentives and constraints. If demand for a good does not match the supply, a price rises or falls, profits accumulate or decumulate, and private agents reorganize inputs of capital and labor to meet the most profitable opportunities. A command system claims to organize production, under subsidy, from a centralized bureaucratic organ. Demand is determined by the policy directives of government authorities. Capital accumulates, through government subsidy, under rationed guidelines to meet established demand policy. Management, motivated by bureaucratic incentives to maintain political control, and supported by Marxist ideology, hoards excess labor inside firms, in order to achieve the full employment objective of the state. A market system imposed on a former command system has never in history been attempted. When such a phenomenon began in East Europe, and spread into Russia, a subject of economic policy was opened and called transition economics [see Fischer and Gelb(1990) for an early treatment].

The first part of the transition literature, following regime changes in East Europe, responded to immediate macroeconomic issues like price liberalization, disinflation strategies, convertibility, and trade liberalization [see Lipton and Sachs(1990) for the Polish case]. A second part of the transition literature, following ongoing government reforms in East Europe and the collapse of the command bureaucracy in Russia, responds to the dynamic adjustment process underway in the physical economy. Command production strategies had ultimately led to unserved demand, corrupt networks between government bureaucrats and firms, and misallocated resources [see Shliefer(1988) on corruption]. This literature is dedicated to outlining solutions to reallocate resources and improve production through privatising and restructuring state enterprises, and attempts to illuminate phenomena like transformational recessions and long run growth out of the command system [see the 1993 Francois Perroux Lecture by

Janos Kornai for a nice treatment]. Most of both parts of the transition literature, however, has treated the effects of government informally. This paper is motivated by an interest in providing formal analysis for the ongoing debate on the consequences of the adjustment process in production, capital, and labor from subsidized initial conditions. In addition, the formal approach addresses the informal debate about the prospects of privatisation strategy and subsidies, and examines the effects tax policy, under a subsidy regime, has on this abstract process of long run accumulation.

Section Two of the paper examines recent data on output and employment growth in eight countries in East Europe and in fourteen republics within Russia. Along with comments on the data, the section examines, in detail, the economic legacy of the bankrupt subsidy system uncovered up by economists at work on market reforms. Section Three studies a process of decentralized market adjustment, where one of the crucial assumptions models the existence of two production sectors in the aftermath of the command system, each given the incentive to maximize returns on assets within the sector. One sector represents the subsidized state enterprises, and the other sector represents the emergent private enterprises. The model concludes that the path of adjustment is unstable, with one sector, in the limit, serving all demand. Section Four studies the comparative dynamics of the system to explain the facts of macroeconomics output collapse, and related output collapse measures, presented in Section One. Section Five analyzes the effects of privatization strategy within the model, and how government tax and transfer policy can be adjusted to speed up the dynamic adjustment process from subsidized initial conditions, and provide a democratic counterweight to the subsidy interests. Xs A Summary concludes.

2 The Facts

A. The Facts on the Macroeconomic Conditions of Transition Economies

Consider the initial collected facts on state sector and private sector macroeconomic growth conditions of the transition economies. The data for Central Europe is presented in the first table, found below. The data for Russia and the surrogate states are found on the following page.

Table 1: Total GDP growth and the Private Sector Share

Central Europe
(growth calculated from 1989-92, share in %'s)

State	Annual Growth (GDP)	Private Share (GDP)	Private Share (emp)	Private Share Growth (GDP)	Private Share Growth (emp)	Annual Growth Labor Prod.	Annual Growth Private GDP	Annual Growth NPriv GDP
Bulgar	-9	16	14	21	34	-10	10	-10
Croat	-17	19	12	31	16	15	9	-19
Czech	-6	20	16	49	139	-38	40	-8
Hungar	-5	25	-	18	-	-	12	-7
Poland	-5	48	51	14	5	10	8	-10
Romani	-11	26	22	19	54	-24	6	-13
Sloven	-5	20	23	24	14	9	18	-7

Source: EBRD

Table 2: GDP Growth and the Private Sector Share

Former Soviet Union
(growth calculated from 1989-92, share in %'s)

State	Annual Growth (GNP)	Private Share (GDP)	Private Share (emp)	Annual Growth Private (GDP)	Annual Growth Private (emp)	Annual Growth Labor Prod	Annual Growth Private GDP	Annual Growth N-Priv GDP
Armen	-14	37	37	46	33	9	25	-18
Belar	-3	8	4	12	31	-14	9	-4
Eston	-13	22	15	12	20	-7	-3	-15
Georg	-19	23	-	10	-	-	-12	-21
Kazak	-1	12	4	-7	10	-17	7	1
Latvi	-14	-	6	-	41	-	-	-
Lithu	-14	20	25	18	80	-35	1	-16
Russi	-7	10	5	24	44	-14	15	-9
Ukrai	-6	10	-	-	3	-	-3	-6
Uzbek	-4	7	24	-18	3	-23	-21	-2

Source: EBRD
Eston, Kazak, and Uzbek numbers: 91-92, 89-91, 91-92
Georg, Russi, and Ukrai numbers: 89-91

The reference for the private sector data is the European Bank for Reconstruction and Development Annual Economic Outlook, published in September 1993. The author collected data for eight countries in East Europe and fourteen republics in Russia, and compiled two measures of emergent private sector activity: The private sector share in gross domestic product(GDP), and the private sector share in total employment. The ultimate source for the data are national statistics and macroeconomic bureaus, the Vienna Institute for Comparative Economic Studies, the United Nations Economic Commission for Europe(UNECE), and the PlanEcon Review and Outlook. In reviewing the data, note the tables have missing data, with measures of private sector output in the surrogate muslim republics the obvious example.

Definition problems exist too. The United Nations introduced a new System of National Accounts for these countries in 1993. This accounting system defines four sectors in these economies: The corporate sector, which includes cooperatives, the government sector, the household sector, and the rest of the world. The corporate sector aggregates three kinds of firms: the private sector, cooperatives, and the state sector. To produce a three year time series from both samples, the author lists both private sector data and private sector plus cooperative data, where the latter is noted in parentheses. For the purposes of this paper, consider the state sector to be firms formerly or presently under government subsidy and the private sector to be firms not under government subsidy. The pre-1992 private sector consisted mainly of the self-employed, retailers, and small scale farmers. Cooperatives in both samples consist of firms who lease assets from state enterprises. Both samples do not include in the private sector state enterprises that were 'commercialized', that is, where owners and managers have not changed. Examples are leaseholders and foreign-owned firms in Poland; new cooperatives, small enterprises, and leasing arrangements in Russia; and business or other small cooperatives in Hungary.

Measurement error is also a serious problem. Agents in the unsubsidized

private sector do not report, or underreport, activities to avoid corporate tax payments and social security tax payments. For example, in Bulgaria in 1991, private sector data which includes 'irregular' activities was four times the official measure of 5 percent of GDP. In Hungary, private sector data, reported from 1990 tax returns and listed in the table, was 57 percent of GDP. Estimates which include 'irregular' activities state a private sector of 65 percent of GDP.[1] To summarize, the data suffer from numerous independent sources, missing facts, definition problems, and serious measurement error. All imply significant distortions exist in the tables. However, the data do reveal certain important regularities that are robust to region and, sometimes, to the time of reform.

For example, in 1989 through 1992, the tables for East Europe show Poland and Hungary with large private sectors established prior to the collapse of the command system. Poland maintained a large unsubsidized private agricultural sector and Hungary entered the period with substantial numbers of mixed ownership firms. Both economies experienced private sector growth from this large base. Other economies in East Europe began reforms with smaller unsubsidized private sectors. Yugoslavia allowed a small unsubsidized private sector in agriculture and services, and the successor states of Croatia and Slovenia show strong growth from this base. Bulgaria had some agriculture and artisan activities in the unsubsidized private sector and shows strong growth from this base. The economies of Czechoslovakia and Romania suffered under regimes which retained a comprehensive command system until the fall of the communists. Romania was considered the most centralized economy in East Europe; even cooperatives were subject to the central plan. Both economies have had strong private sector growth since the fall of the communists.

All the economies of East Europe, however, experienced negative total output growth during the period, a phenomenon dubbed by Kornai as the trans-

[1] 'Measurement of the private sectors contribution. Accounting for CPEs in transition: system related issues in measuring economice performance', World Bank(1992)

formational recession. Poland and Hungary, with the largest existing private sectors, have experienced the least decline in output. While the growth of the private sector GDP was positive for all the economies of East Europe, this growth has not outweighed the output loss experienced by the state enterprise sector. In addition to this, labor productivity growth in the private sector was negative for countries in East Europe with late reforms, and positive for those with early, more comprehensive reforms. This means private sector output growth was less than private sector employment growth for most countries in East Europe during the three year period.

The surrogate states of Russia desplay regularities too. Four of ten republics show positive private sector output growth: Armenia, Belarus, Lithuania, and Russia. Estonia, Georgia, Kazakhstan, Ukraine, and Uzbekistan show negative private sector output growth. In Kazakhstan and Uzbekistan, private sector output growth declined even more rapidly than the growth of state enterprises. In Kazakhstan, state enterprise growth was slightly *positive* during the period. By 1992, Estonia and Lithuania had the largest private sectors among the former surrogate states, at 22 percent and 20 percent respectively, although these fell short of the 35 percent and 42 percent levels achieved in Hungary and Poland. Comparisons on the share of the private sector in total employment in the surrogate states is too incomplete to exhibit regularities. Private sector labor productivity growth was negative for all surrogate states except Armenia, meaning growth in private sector GDP was less than growth in private sector employment.

Some qualifications with repect to the republics need to be stated. The data for Georgia, the author admits, are poor. In addition, Georgia has instituted land reforms to return 50 percent of agriculture to the private sector. The Baltic states and Russia have been the quickest to introduce and implement reforms among the surrogate states. The negative private sector growth in Estonia, the author admits, are subject to significant measurement error.

Combine the events of both regions and the common portrait of real adjustment appears. The combined economies exhibit negative private sector labor productivity growth, with the exceptions of Croatia, Slovenia, Poland, and Armenia. This means private sector employment growth outpaced the slower private sector output growth. The combined economies also exhibit negative total output growth, with negative state enterprise growth the contributor to the decline. The exception is Kazakhstan. To provide contrast, consider the significant, consistent positive private sector output growth in East Europe versus the inconsistent private sector output growth in Russia and its surrogate states. One might conclude, preliminarily, that the economies which have implemented reforms to leave the command system and its subsidies earliest have experienced the most significant private sector output growth. Therefore, *ex post*, economies new to the reforms can expect booms in the emergent private sector, and those economies where the command system remains in place, perhaps Kazakhstan, cannot expect an expansion in the emergent private sector.

These data reduce to three stylized facts summarizing the output collapse in the aftermath of Communism. One, the emergent private sector expanded rapidly in economies where it was been allowed to operate. Two, while the expansion in private sector output has been large, the private expansion has not been large enough to dominate the state enterprise sector output collapse, at the macroeccnomic level. Three, the private sector expansion has not been able to maintain labor productivity.

B. The Facts on the Effects of State Subsidy

The state enterprise sector formed during the command system. Its negative output growth, exhibited in the tables on East Europe and the republics of Russia, suggest that legacies of the command system are important determinants of the long run growth possibilities of these economies. This paper abstracts from the many dimensions of the state enterprise production to focus on two

dominant imperatives of the command system. The first imperative is that state production eliminated outside interests. Second, state production required persuading managers to pursue the political objectives of the state bureaucracy. The economic direction of this system was then steered by the maintenance of a subsidy system. Below is a more detailed examination of the effects of these two imperatives.

The fact that planning eliminates outsider interests is initiated by a command bureaucracy which controls economic behaviour through rationed production and investment. In this system, prices and productive capital become irrelevant, and, therefore, the system eliminates the need for an agent to represent productive capital. Various authors label this economic pathology as absent outsider ownership, absent outsider principals, the equity governance issue, or the corporate control issue [see Carlin and Mayer(1992)]. The absent agent, and the substitute role created for command bureaucrats as the agent for rationed capital, has produced black market activity and critical missing institutions when an attempt to transform the state enterprises into corporate forms has been tried. With no agent for capital, managers and workers have incentives to decapitalize the firm through so-called 'nomenklatura' or 'spontaneous' asset confiscation, also known as theft. It has also led to excessive wage increases [see Sachs(1992) for the Russian case]. The absent agent also leaves managers with bargains to be made with command bureaucrats over rationed capital. After the collapse of the command system, managers continued to serve the demands of command bureaucrats, in exchange for subsidies, over the demands of product market customers. The absent agent for capital also led to the absence of modern market accounting, as there was no need to account for capital, the absence of bankruptcy legislation, as bankruptcy could not occur, and the absence of financial intermediaries, as there was no need to store or transfer productive capital.

The fact that planning requires managers to pursue political objectives re-

quired the bureaucrats in the command system to subsidize managers in the state enterprises. In return for the subsidies, the managers hired excess labor and located in inefficient places. The labor hoarding at the end of the command system measured 15-20 percent of the labor force in Hungary, 25 percent of the labor force in Poland, and 20 percent of the labor force in Czechoslovakia [see Burda(1992)]. At the end of the command system in Russia, this practice left firms with three possible ties to the command system. Some enterprises operated under direct subsidy from the reform government, as they did under the old command system. Other firms relied on sales to final goods customers for wage revenues and recieved a subsidy for other production costs from the government. Many of these enterprises contracted financial services to a financial monopoly called an association or capture bank. These banks supply a subsidy along with financial services to all firms in one industry, where the bank forces the firms in the industry to contract all financial services in exchange for the subsidy. The final group composes the emergent private sector, which recieve no subsidy [see Ickes and Ryterman(1993)]. In Russia in 1992, directed credits from the Central Bank were 21 percent of GDP, with agriculture, energy, and very large manufacturing firms the primary beneficiaries. Total subsidies from the government added up to an additional 21.6 percent of GDP, with import subsidies, energy subsidies, and subsidies for interest payments on already subsidized credit [see Boycko, Shliefer, and Vishny(1993)]. Clearly, the subsidy has been a dominant form of political control over the economic production structure. The remainder of this paper is organized around the idea that this history of government subsidy determines the direction the process of transition to decentralized markets will take.

3 A Model

The subject of transition modelling has seen formal treatment. Early models took up the subject at the initial conditions and sought to understand how economic matters might look after price liberalization, the removal of government subsidies, and the rise in energy prices. These models typically have three stages. The first stage is a pre-transition stage where prices matter slightly, the government manages workers through the control of managers, and the firms are subject to budget constraints with government subsidy, the so-called 'soft' budget constraint. The second stage is the period where the subsidies are removed and prices are set free, but no change in corporate governance occurs. The third and final stage brings about changes in the management of the enterprise [see Estrin and Hare(1992)].

The assumptions made in the models have much in common. Typically, the technology is one of fixed coefficients, where the assumption is justified by measurements of the elasticity of substitution between capital and labor in East Europe of less than one. The constraint on output is capital, while the objective is growth through capital accumulation, aimed at an exogenous capital growth target. Labor is rationed to maintain full employment, prices and wages are set by central authorities, and subsidies are given to firms by government. In a transition stage, the subsidies are cut, prices and wages are freed, and growth through capital accumulation is determined by market incentives [see Desai and Estrin (1992)]. Similar assumptions have also been employed outside the transition literature to illuminate the uneven capital accumulation visible in the trading international economy [see Krugman(1979)].

The new assumption this author will add is that there are two sectors in the aftermath of the collapse of the command system, the old state sector, and the new private sector. The survival of the two sets of firms will be determined in a competition for domestic demand in the newly decentralized product markets. Assume the state and private sector require both capital and labor as inputs.

State enterprises, as a result of past government subsidy under the command system, require higher unit input requirements of both capital and labor compared to the emergent private sector unit input requirements, an assumption consistent with the facts for both sectors. In addition, production in both productive sectors is restricted to fixed coefficients technology. There are m firms in the state enterprise sector and n-m firms in the emergent private sector, summing to n total firms in the productive sector. These firms are aggregated into two corporate sectors for the purpose of analyzing subsidies. Labor is distributed among firms at levels necessary to satisfy production demands efficiently. In addition, the surplus labor force, labelled $_{out}$ for outsiders, captures the notion of chronic disequilibrium in the labor market.

Add two other uncompetitive sectors to form the economy. These will be an unproductive surplus labor sector, and a capital goods producing sector. The surplus labor sector acts as an input without productive value. The capital goods sector requires only labor as an input.

$$L_1, \ldots, L_m, \ldots, L_{m+1}, \ldots, L_n \qquad i = 1 \ldots n \qquad \sum_{i=1}^{n} L_i + L_{cap} + L_{out} = \bar{L} \quad (1)$$

The past legacy of rationed resource allocation is modelled by assumptions. A first assumption captures the difference in efficiency between the two productive sectors, and is modelled by high unit labor and capital requirements in the state enterprise sector with respect to the emergent private sector. A small c represents the unit capital requirement and a small v represents the unit labor requirement. This is the first effect of government subsidy.

$$c_1 > c_2 \cdots c_m > c_{m+1} \cdots > c_n$$
$$v_1 > v_2 \cdots v_m > v_{m+1} \cdots > v_n \quad (2)$$

A second assumption captures the notion that the composite capital stock of the state sector is larger than the composite capital stock of the new private sector. This is the second effect of government subsidy.

$$K_{old} > K_{new} \tag{3}$$

A third assumption captures the notion that subsidized, hoarded labor has been partially dishoarded into an unproductive surplus labor sector, which then acts as a residual claimant. Define M_i to be the output produced by firm i. Then the following must be true.

$$L_{out} = \bar{L} - \sum_{i=1}^{n} v_i M_i \tag{4}$$

If output in each productive sector with fixed coefficients is limited by the scarce input,which is capital, the following production function holds for each manufactures sector.

$$M_i = \frac{K_i}{c_i} \qquad \forall i \tag{5}$$

Insiders in each productive sector, managers and workers, bargain to set the wage, and bargaining power is equal across sectors, Therefore, insider wages are equal across sectors. This wage becomes the numeraire in the budget constraint of the productive firms. This wage is also the capital goods producing sector wage. Managers objectives in both productive sectors are to maximize asset returns under their control. Government pays the surplus labor force unemployment compensation. Government sets unemployment compensation to be less than the insider wage minus the disutility of work to provide incentives to return to productive work. Given the wage is numeraire, unemployment compensation is then subject to be strictly less than one.

The rental price on a unit of capital is considered the profit which attracts capital investment. Rearrange the budget constraint for one unit of output to get the profit rate in terms of prices and unit input requirements. Profit rate in this budget constraint then increase with either a rise in output price, or a fall in either unit requirement.

$$q_i = \frac{P_i - v_i}{c_i} \quad i = 1, \ldots, m \qquad q_i = \frac{P_i - v_i}{c_i} \quad i = m+1, \ldots, n \tag{6}$$

Assume capital, whether it is considered bank deposits, lending to other firms in the same sector, increases in fixed assets, increases in working capital, or inventories, responds directly to the profit rate. Capital accumulation in both sector then increases directly with the profit rate.

$$\frac{\dot{K}_o}{K_o} = q_o \qquad\qquad \frac{\dot{K}_n}{K_n} = q_n \tag{7}$$

Prices in both sectors are determined in equilibrium when the productive sector's output, the supply, equals total domestic demand. As a fourth assumption about state subsidy, allow prices on the goods each sector produces to depend on the relative demand for the goods in the two sectors. This captures the notion that receiving state subsidy required producing certain goods.

$$P_o = f(\frac{D_o}{D_n}) \qquad\qquad P_n = f(\frac{D_n}{D_o}) \tag{8}$$

Consumers equal the labor force. The economy is closed, so consumers income is spent on domestic goods. The capital goods producing sector just requires labor to produce, so wages paid to capital goods labor accounts for returns to the capital used by the two productive sectors. This assumption allows income to equal spending equation in the following manner. [2]

[2]It is not difficult to introduce a degree of 'openness' to the model. Introduce $\mu_s.t.0 < \mu > 1$, where μ is the marginal propensity to spend on domestic goods. Given the inefficiencies which exist in the aftermath of a subsidy system, it is not difficult to imagine that high tariffs

$$\sum_{i=1}^{n} P_i M_i = [\sum_{i=1}^{n} L_i + L_{cap} + S_1 L_{out}]$$

$$S_1 = \text{unemployment compensation} \qquad 0 < S_1 > 1 \tag{9}$$

This closes the model. Equations for the profit rates in both sectors must be constructed by combining the above relationships. Then, implications for capital accumulation can be examined, and an optimal strategy for a sector interested in maximizing returns on assets through its capital accumulation can be drawn from the implications.

Domestic goods market equilibrium implies that from equations (7) and (4)

$$\sum_{i=1}^{m} P_i \frac{K_i}{c_i} = [\sum_{i=1}^{n} L_i + L_{cap} + S_1 L_{out}] - \sum_{i=m+1}^{n} P_i \frac{K_i}{c_i} \tag{10}$$

Assume equal relative prices in each sector and different relative prices across the two sectors. Replace the summed capital and summed unit capital requirements with averaged firm capital and averaged unit capital requirements. There are then two composite sectors, the state enterprise sector, with a large stock of accumulated capital and inefficient unit labor and capital requirements, and a new private sector with little accumulated capital and efficient unit labor and capital requirements. This represents the legacy of the past endowed in initial conditions to the economy by the command system of former communist regimes. In a competitive market, however, there can be no difference in prices between suppliers. If there is a difference in price introduced by inefficient use of inputs, for example, then the difference must be compensated for by a subsidy from the government. This equalizes final goods market prices across sectors. At this point, consider the subsidy and unemployment compensation to have no counterpart in taxes.

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on imports, to elevate the marginal spending on domestic goods, would be a rational strategy for the domestic sectors.

$$(P_o - S_2)\frac{K_o}{c_o} = [\sum_{i=1}^{n} L_i + L_{cap} + S_1 L_{out}] - P_n \frac{K_n}{c_n} \qquad (11)$$

Use equation (6) to bring in profit

$$[(q_o c_o + v_o) - S_2]\frac{K_o}{c_o} = [\sum_{i=1}^{n} L_i + L_{cap} + S_1 L_{out}] - (q_n c_n + v_n)\frac{K_n}{c_n}$$

$$q_o = \frac{[\sum_{i=1}^{n} L_i + L_{cap} + +S_1 L_{out}]}{K_o} + \frac{S_2}{c_o} - [q_n \frac{K_n}{K_o} + \frac{v_n}{c_n}\frac{K_n}{K_o}] - \frac{v_c}{c_o} \qquad (12)$$

Profits in the old state sector depend on three terms. One, a positive effect on profits in the form of a three component demand term, one of which, it is interesting to note, is the subsidy to the old state sector for investment capital and labor hoarding. Two, a competition term which introduces the negative effect of new private sector activities upon the profits of the old state sector. And three, a cost term which reflects the negative effect of old state sector unit labor and capital requirements upon old state sector profits. Symmetry yields a similar result for the new private sector.

There are three ways to look upon profit rates and capital accumulation that aid understanding of the implications of the model. The three equations for the state enterprise sector and the new private sector are listed separately for convenience.

State Enterprise Sector Profits

An equation with the new private sector profit rate and unit input requirements.

$$q_o = \frac{[\sum_{i=1}^{n} L_i + L_{cap} + S_1 L_{out}]}{K_o} + \frac{S_2}{c_o} - \frac{K_n}{K_o}[q_n + \frac{v_n}{c_n}] - \frac{v_o}{c_o} \qquad (13)$$

An equation with the new private sector prices and unit input requirements, where the introduction of the relative demand term removes the effects of the price of the new sector good and replaces it with the relative demand in the two sectors.

$$q_o = \frac{[\sum_{i=1}^{n} L_i + L_{cap} + S_1 L_{out}]}{K_o} + \frac{S_2}{c_o} - \frac{K_n}{K_o}[\frac{f(\frac{D_n}{D_o})}{c_n}] - \frac{v_o}{c_o} \qquad (14)$$

A dynamic system

$$\dot{K_o} = [\sum_{i=1}^{n} L_i + L_{cap} + S_1 L_{out}] + \frac{S_2}{c_o} - K_n[\frac{f(\frac{D_n}{D_o})}{c_n}] - \frac{v_o}{c_o} K_o \qquad (15)$$

New Private Sector Profits

An equation with the state enterprise sector profit rate and unit input requirements.

$$q_n = \frac{[\sum_{i=1}^{n} L_i + L_{cap} + S_1 L_{out}]}{K_n} + \frac{S_2}{c_o} - \frac{K_o}{K_n}[q_o + \frac{v_o}{c_o}] - \frac{v_n}{c_n} \qquad (16)$$

An equation with the state enterprise prices and unit input requirements.

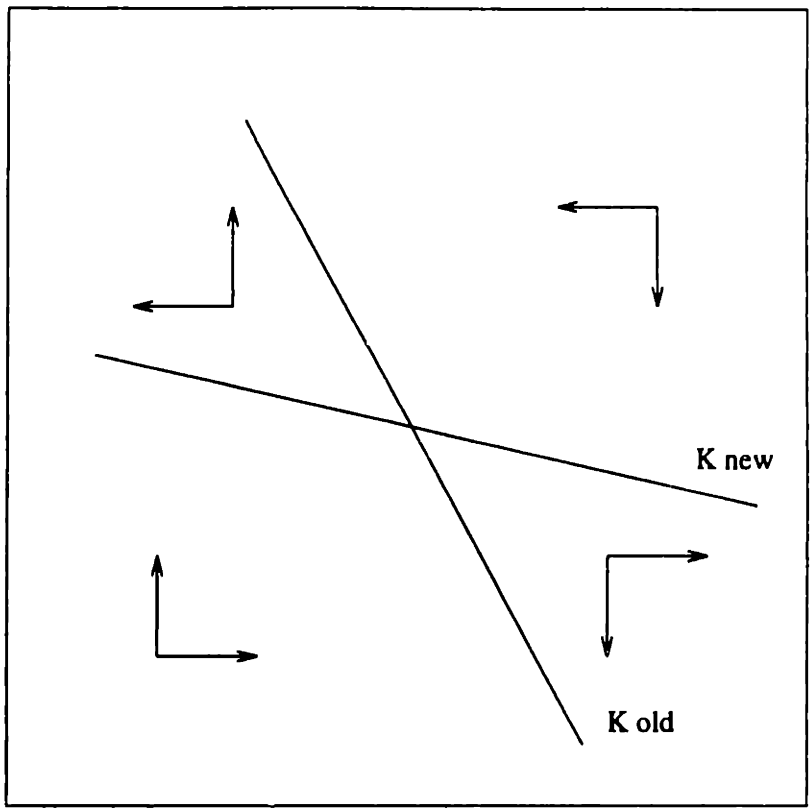
$$q_n = \frac{[\sum_{i=1}^{n} + L_{cap} + S_1 L_{out}]}{K_n} + \frac{S_2}{c_o} - \frac{K_o}{K_n}[\frac{f(\frac{D_o}{D_n})}{c_o}] - \frac{v_n}{c_n} \qquad (17)$$

A dynamic system

$$\dot{K_n} = [\sum_{i=1}^{n} L_i + L_{cap} + S_1 L_{out}] + \frac{S_2}{c_o} - K_o[\frac{f(\frac{D_o}{D_n})}{c_o}] - \frac{v_n}{c_n} K_n \qquad (18)$$

Place both dynamic equations in a space defined by old state enterprise capital and new private sector capital, and a view of the adjustment process in the economy can be examined.

State Enterprise
Capital



Private Sector
Capital

Consider the dynamics of the system in the graph drawn above. With plausible assumptions on unit labor and capital requirements for the state sector, the process of capital accumulation appears unstable. If state enterprises enter the market system with larger accumulated capital stocks than the private sector, the state sector will serve a larger proportion of demand. Profits on assets in the state sector will be greater than profits on assets in the private sector. Arbitrage on profits of assets between sectors will pull assets into the state sector, profits will rise even higher, and the state sector will accumulate

even more capital. This capital relaxes the capital constraint in the old state sector, and reduces demand available for the new private sector, so profits in the new private sector will fall, and capital accumulation will decline in the private sector. This process of reinforcing profits and accumulation continues, until, in the limit, the sector which began with a larger capital stock, the state sector, ends the adjustment period serving all demand in the economy.

Critics of state enterprises hold the view that rationed accumulated capital has no value within market systems. If this is true, then state sector assets have no market value and a new private sector must expand activity and accumulate new productive capital to take its place. This model concludes that, initially, if the state sector recovers productive capital from the rationed capital stock which is greater than the initial capital accumulated in the new private sector, the state sector must expand, and, in the limit, dominate production in the market system. If the private sector has no history of capital accumulation, such a capital threshold will be low.

In summary, the dynamics of the adjustment process are unstable, with one sector, in the limit, capturing all demand. The initial capital stock position of one sector relative to the other sector is an important indicator of the eventual market position of both sectors. Under the command subsidy system, this is an important result to consider, as it implies that a legacy of government capital subsidy should promote expansion under a new market regime. However, other factors determine the profit rate in both sectors. Some reinforce the initial capital conditions, such as the overall level of spending in the economy, while others work against the accumulation effects of capital, such as high unit labor requirements, which is another subsidized legacy of the command system. In addition, the capture of financial institutions to block the transfer of assets between sectors and transmit government capital subsidies to the patron sector is a rational economic strategy for either sector, as capital accumulated through bank credit in a competing sector depresses the profits of capital in the sector

where a system of banks has previously extended credit.

Since this conclusion does not represent the recent facts about output growth, it is necessary to examine more carefully the variables in the accumulation equations which influence the rate of profit. Such analysis can uncover the ultimate determinants of the output sector collapse, which, at this level of analysis, is not predicted. This is one goal of the next section. The next section will also deal with the effects of privatisation.

4 Comparative Dynamics

In the model of the previous section, the state enterprise sector, with a large initial capital stock, and other things held equal, was predicted to expand rapidly into new markets. The facts indicate the sector collapsed, while the private sector expanded. This section is dedicated to uncovering some reasons for this result. Below is a study of the effects of the underlying determinants on the profit rate and capital accumulation.

[A] Profits in both sectors increase with the size of domestic market demand: $[\sum_{i=1}^{n} L_i + L_{cap} + S_1 L_{out}] + \frac{S_2}{c_o}$. This could be productive labor force growth, $\sum_{i=1}^{n} L_i$, an increase in capital goods employment, or an increase in government unemployment compensation, S_1, or an increase in the state enterprise subsidy, S_2.

[B] High unit labor requirements, v_o, in the own sector lowers own sector profits. High unit labor requirements in the other sector, v_n, also lowers own sector profits. If both sectors reduce unit labor requirements to increase relative capital intensity, prices on final goods will fall, more spending will be available to both sectors, and profits to capital will rise.

$$\frac{\partial q_o}{\partial v} = -\frac{K_n}{K_o}\frac{1}{c} - \frac{1}{c} \tag{19}$$

[C] Profits fall in both sectors when either sector reduces unit capital requirements. The optimal strategy for both sectors is to maintain the existing capital stock.

$$\frac{\partial q_o}{\partial c} = -\frac{S_2}{c_0^2} + \frac{K_n}{K_o}[\frac{f(\frac{D_o}{D_n})}{c_n^2}] + \frac{v_o}{c_o^2} \tag{20}$$

[D] If capital accumulates in the own sector, relative profits rise in the own sector. If capital accumulates in the other sector, unambiguously, the own sector profits falls.

$$\begin{aligned} \frac{\partial q_o}{\partial K_o} &= [\frac{f(\frac{D_o}{D_n})}{c_n}]\frac{K_n}{K_o^2} \\ \frac{\partial q_o}{\partial K_n} &= -\frac{1}{K_o}\frac{f(\frac{D_o}{D_n})}{c_n} \end{aligned} \tag{21}$$

By looking at each of these exercises in turn, we can identify the source of the output collapse.

In part [A], one hypothesis which may explain the facts of adjustment can be called the negative spillover effect of labor force reductions. If all state firms shed surplus labor, these workers would accept lower incomes through unemployment compensation in exchange for the lost productive wages. Such a demand shock would be magnified by the absence of a social benefits system, and in many economies of East Europe, and in Russia, unemployment compensation is poor or does not exist [see Economist Dec(1993)]. Partial dishoarding, combined with absent unemployment compensation, would also explain some of the negative

labor productivity in the private sector data, as workers released by the state firms attach to private sector enterprises for subsistence. However, this hypothesis must be rejected, as a demand shock would have symmetic effects on both sectors, and the old state sector output fell while the new private sector output rose. This is clearly at variance with the facts.

In part [B], higher unit labor requirements in the state sector would reduce profits for that sector, lower investment in the sector, and slow adjustment. Such an effect has a symmetric increase in profits for the private sector, so this static could be part of an adjustment story. However, this is an adjustment effect, and not likely to account for the sudden collapse in output.

In part [C], neither firm has an incentive to reduce unit capital requirements, so this is not going to explain the facts.

In part [D], the partial effect states that an increase in accumulated capital in the competing sector reduces the profit rate of the sector which did not recieve the capital. Under a legacy of banking connected to financing the needs of the old state sector, this legacy could explain why the increase in the private sector has not kept pace with the reduction of output in the old state sector. However, as an explanation of private sector growth and old state sector collapse, it must be rejected.

Another hypothesis from part [D], above, comes from the result that both firms profits depend on the relative demand for the goods produced by the two sectors. A sudden shift in this variable would produce a collapse in demand in one sector and an increase in demand for the other sector. If the demand for the output in the state sector falls, the price for these goods fall, profits on the capital invested in this sector falls, investment falls, and labor would be shed to maintain a solvent firm. This shift would initiate a symmetric story for the output of the private sector. If the demand for state sector goods falls, the relative demand for private sector goods rises, the price for these goods rises, profits on the capital invested rises, investment rises, and the private firm hires

labor to serve the increased demand.

If there was a sudden shift to the market, and consumers decided state goods were useless, and the new private sector goods useful, then, both relative demand effects would compound the change, and cause a sudden collapse in output of the state firms, and a rise in the output of private firms. This would be accompanied by further transmission into a price collapse for the state goods, a profit collapse, an investment collapse, and a need to shed labor to remain solvent, or a demand for greater subsidies. Simultaneously, the private sector would see output boom, price increases, profit increases, investment boom, and labor force hiring. If the collapse in state sector demand was greater than the rise in private sector demand, then there would logically be negative overall output growth and negative labor productivity in the new private sector, as the workers in the state firms who were dismissed would be counted as members of the new private sector.

This relative demand hypothesis is entirely consistent with the facts and must be provisionally accepted as the underlying ultimate determinant of output collapse. In some sense, after a political collapse, and higher unit labor and unit capital costs, and a distorted capital allocation, the *fait accompli* of the socialist subsidy system was surely the useless value of the products produced by state firms, which under a sudden adjustment to dynamic market capitalism, leads to output collapse, and, if enough of the goods are useless, to depression. This seems to be the case in the command systems of East Europe and Russia. Whether such uselessness corresponds to the capital stock is a critical question to explore. One can only hope positioning of a significant amount of useful state sector capital to serve market demand for desirable goods is somehow possible in a short time period.

5 Economic Policy

A. Replacing Profits by Privatization

Part [B] identified high unit labor requirements as one possible cause for the static adjustment in the state enterprise sector. By assumption, state enterprises claim higher unit labor and unit capital requirements than the private sector. The model concludes that this combination of high costs will not necessarily affect profits, but significant amounts of surplus labor, such as the 20 to 25 percent of the labor force inherited as surplus workers from the command system, would depress the profits to capital in the state sector. Such a distortion would allow for the slow adjustment of the state sector, and the rise of a new private sector. This hypothesis gets support from the results in the model. To allow the state sector to compete in decentralized markets, the managers of state firms must have the authority to fire workers. In a capitalist system, this authority is granted by an outside agent of capital, typically composed of stock holders in the firm. These agents with claims to the profits of the firm elect a board of directors, whose mandate is to maximize shareholder profits. This institution hires managers who are given the incentive to organize the productive operations around the objective of maximizing shareholder profits.

With this partial effect, and the overall dynamic adjustment and accumulation strategy in mind, the reform effort promoted privatization strategies focused on actions to organize outside interests, to protect and to accumulate the capital stocks of the old state sector. However, instead of granting outsider interests authority and control of enterprises, the privatisation strategies in East Europe and Russia display a strong bias towards internal control. In Poland, Hungary, and Czechoslovakia, governments began privatisation by consulting with ministries, worker councils, and management, before setting the privatization agenda. The result was insiders, the managers and workers, kept majority

ownership in the firms where they worked. This prompted a shift towards a less secure state of affairs, where the assets of firms were lost through theft, wage increases, and stalled labor reductions. The overall speed of privatization was also slowed down by this process. In Poland, for example, it took almost a year to select five large companies for privatisation [see Sachs(1992) for details].

After this, Poland designed a Mass Privatisation Program, where investment funds manage holdings of outsider claims on firms attained through voucher programs. These investment funds are supposed to act as the agent for capital, and the government plans to establish 10 or 20 of these funds. The government will allocate 33 percent of shares to a single fund, 27 percent to other enterprises, 10 percent to insiders, and 30 percent will be kept by the treasury. Housholds purchase shares, or vouchers, for a nominal fee [see Carlin and Mayer(1992)].

In Czechoslovakia, the pace of privatization has been equally slow. For large firms, the government plans to convert ownership as well, with 3 percent assigned to the National Property Fund, 5 to 10 percent to foreign firms or individuals, and the rest of the claims distributed through vouchers to households. The cost of a household voucher booklet is about a weeks wage. These vouchers can be placed in over 500 investment funds, where a small number of funds have acquired the great majority of vouchers. Polls suggest 40 percent of vouchers remain in the investment funds [see Carlin and Mayer(1992).

In Russia, privatisation did not follow the models in Poland and Czechoslovakia. The Russian Mass Privatisation Program allows managers and workers to choose one of three ownership divisions: One, 5 percent of shares to managers, at a nominal price, 25 percent to workers, which were non-voting, and 10 percent to both, in a sort of ESOP. Two, 51 percent to managers and workers, at the price of 1.7 time the book value of 1992 assets. Three, 40 percent to managers, in the form of stock shares at low prices. The rest of ownership went to outsiders through vouchers. At this stage, insiders have chosen plan two 78 percent of the time and plan one 21 percent of the time, with capital intensive

firms or those with poor relationships between managers and workers choosing plan one. After active secondary markets, closed subsriptions, and ESOPs, managers and workers have achieved control of 70 percent of shares on average. In a finer breakdown of ownership, 17 percent have gone to managers, with 7 percent to CEOs, 14 percent to outsiders, with 9.5 percent to blockholders, and 16 percent to the Property Fund, with 10 percent transferred by ESOP to insiders in the future [see Boycko, Shliefer, and Vishny].

In East Germany, the state privatisation agency, the Truehandanstalt(THA), supervised the task of restructuring the state enterprises. The agency has created boards of directors to monitor management, to evaluate enterprises and adjust balance sheets, to reorganize or close firms, to find and evaluate buyers, and to impose employment and investment targets. As an example of the importance of the outside agent for capital, one of the THA's first actions was to recruit thousands of West Germans to chair supervisory boards. Employee representatives were placed on boards after being elected by works councils. Employees of banks made up 20 to 25 percent of the directors, local authorities made up 10 to 15 percent of the directors, and other company executives made up 60 to 70 percent of the remaining directors. When firms were sold, 5 percent have gone to non-German foreign buyers, 18 percent to management, and 77 percent to West Germans companies. In addition, the West German government has invested in 1992, an annual 95 billion DM out of the 180 billion DM allocated to East Germany in the form of public sector capital spending, investment grants, interest subsidized loans, and tax concessions [see Hare and Hughes(1992)].

What does all this mean for capital accumulation? An organized agent for capital in the old state sector has not been established in force in any country other than East Germany. The result has been that hoarded labor acts as a counter effect to the capital stock legacy of the command system, which should expand operations towards profitable opportunities in the new market environ-

ment. While some countries, Poland and Czechoslovakia, have plans to address the problem, surplus labor still has a dominating, negative effect on capital accumulation in the state sector thoughout the former command economies.

B. Cutting Subsidies and Imposing Taxes

The state sector subsidy may explain static state enterprise adjustment in the face of new market opportunities. With command system subsidies of greater than 50 percent of GDP, government determined transfers prop up the inefficient state sector in the competitive markets at a high cost to other productive agents, which must be taxed to pay for the subsidies. The subsidized sector has reduced incentives to make operations efficient, by lowering unit labor and capital requirements, and instead, the subsidies create an incentive to negotiate with the state. Privatisation has been seen as the primary means of productive sector reform in these former command economies. The model makes the point, however, that even if an agent for capital is installed in firms in the state sector, the rational economic agenda for these agents is to maintain the subsidy and cut the surplus labor force. As a word of caution, though, the subsidy may be necessary for proper adjustment. In the face of a profits collapse, the subsidies may be working capital for the distressed firm which may, in time, be capable of adjustment. It may also be destabilizing politically to cut the labor subsidies to firms which employ large amounts of workers. Such considerations need to be included in constructing any program which suggest cuts in subsidies.

A related issue is favorable credit terms provided through the central bank or former state banks to the old state sector. Commercial banks in command economies did not operate, as the capital in capitalism was seen as both an enemy of the state and an exploitive apparatus of the workers. What were called banks amounted to accounting arms of the state plan to ration output, capital, and labor. After reform, these banks were made 'private', which only meant they remained under the control of command bureaucrats, who continued to

use these institutions to distribute cheap credits to the state sector. Result [D] shows that a bank system which has claims to the capital stock in a productive sector, with close ties to one productive sector, has incentives to maximize profits to capital in that sector. This relationship produces strong incentives for the state bank not to lend to the new private sector, as it could build a competing capital stock, and reduce the profits to capital in the old state sector.

The macroeconomic effects of a huge state subsidy and state credits is significant and destabilizing. Huge subsidies and credits force the government to accumulate debt, and in lieu of an operating tax or bond finance system, to proceed with money printing and the certainty of hyperinflation. The subsidy also creates a powerful collective interest which will seek to maintain its benefits and frustrate any efforts to cut the state subsidy. From a more positive view, the subsidy supports the spending level in the economy, and acts as a form of excess labor storage in the transition to a market system. It is, in effect, a form of social safety net. Providing a social safefy net would eliminate any positive argument for the state subsidies, and must be considered as appropriate policy.

The issue of addressing the polical economy of subsidies and taxes remain the final economic policy issue for this paper. As a final point of analysis, this paper uses the gross assumption that a reform government would balance its budget, and would pay for politically tactful subsidies and unemployment compensation out of tax revenues. Then, the question remains, what is the optimal tax policy to speed output and employment growth. Assume the government pays subsidies and unemployment compensation out of tax revenues. Then, the government budget constraint can be written as follows.

$$S_1 L_{out} + S_2 = \text{taxes} \tag{22}$$

Define t to be the proportional tax rate which satisfies the above government budget constraint. If the government places the tax on profits to capital, then the adjustment process appears as it does below:

$$q_o = [\frac{[\sum_{i=1}^{n} L_i + L_{cap} + S_1 L_{out}]}{K_o} + \frac{S_2}{c_o}] - [q_n(1-t) + \frac{v_n}{c_n}]\frac{K_n}{K_o} - [\frac{v_o}{c_o}]](1-t) \quad (23)$$

The adjustment process for the new private sector is symmetric. The tax on the profits to capital in the new private sector or the old state sector could lead to significant reductions in the speed of profit accumulation, and therefore slower adjustment to the new market conditions. Under the command system, the central bank-treasury collects state sector profits and distributes them as subsidies and credits, a practice with negative growth implications for the old state sector. Such a profit tax has minimal consequences on the growth possibilities in the new private sector. If tax evasion or poor tax administration in the new private sector also exist, as they do, then the accumulation conditions which signal successful adjustment of the new private sector may improve. This appears to be the case in a number of countries. [see Hare and Estrin?].

If the government places the tax on labor incomes, then the adjustment process for the state sector becomes:

$$q_o = [\frac{[\sum_{i=1}^{n}(1-t)L_i + (1-t)L_{cap} + S_1 L_{out}]}{K_o}] + \frac{S_2}{c_o}] - [q_n + \frac{v_n}{c_n}]\frac{K_n}{K_o} - \frac{v_o}{c_o} \quad (24)$$

The tax on worker incomes, in the model, represents a redistribution of spending among productive and non-productive workers. This revenue collection policy proves to be less onerous to the future growth trajectory of the economy than a tax on profits. If it is implemented by an administrative arm of government, not associated with the central bank, the tax would also remove the primary revenue source for the central bank, a former command bureaucracy. The income tax would focus collective self-interest on the issue of old state sector subsidies, bringing into the political debate a large, economy-wide force for efficient government operations. For all of these reasons, a reform of

the tax collection system towards the use of an economy-wide income tax, and away from the use of a old state sector profits tax, could assist accumulation and growth out of a former command system.

6 Summary

The data show rapid expansion of a new private sector in former command economies. The private sector is larger, and grew faster, the larger the private economic base established prior to reforms outside the state sector. Economies which began reforms earliest exhibit the most robust new private sectors. In spite of this expansion, though, the overall level of output in former command economies fell, as the collapse in output in the old state sector dominated the rise in output in the new private sector. Finally, the new private sector exhibits negative labor productivity growth.

A model explained this process around the organizing state economic instrument of subsidy. The simple result expressed by the logic is that certain significant economic legacies of the former command system, the focus on production of certain types of goods, the high unit labor requirements in the state sector, the profits tax and the captive bank system, create negative effects on the speed and magnitude of disequilibrium adustment. The endowment of productive capital is a positive initial condition inherited by the state sector. In the limit, this initial accumulated capital, under a dynamic profits adjustment of demand determined production, will allow this sector alone to serve all demand.

The facts indicate the new private sector expanded and the state sector collaped in the face of market discipline. The facts indicate that the capital stock advantage has been presently outweighed by other legacies of the command system. A comparative dynamics analysis of the other determinants in the model conclude that the factually consistent explanation for the collapse of the state sector and the simutaneous rise of the private sector has been a sudden shift

in relative demand for the sets of goods each sector produces. The state output collapse suggests that consumers decided a number of state produced goods were useless. The larger number of good deemed useless, the larger the decline in output. This demand discipline led to a price collapse for the state sector, a profits collapse, an investment collapse, and shedding of labor to maintain solvent state firms. Symmetrically, consumers deemed private goods desirable, the private sector witnessed a sharp rise in demand for private goods, a price rise, profit increases, accumulation of investment capital, and hiring of labor to produce the new goods. However, the collapse of demand for state goods dominated the increase in demand for private goods, so there has been negative labor productivity counted in the private sector, as shed workers in the state firms attach to private firms for survival.

A section discussed reform measures which might speed adjustment of the state subsidy firms. Privatisation returns the profit motive to the state firms, and this will ultimately drive down the inefficient high unit labor requirements, as hoarded labor depresses the profits to capital. This hoarded labor has contributed to the slow adjustment of state firms, and, combined with the demand collapse, dominated the positive advantage of accumulated capital for the state sector. While privatisation remains a sound platform for restructuring firms, investigating the existing conditions of reforms which privatize state enterprises suggest that the objective of maximizing the stockholders return to capital invested is not yet the primary objective for a majority of firms emerging from the command system.

The subsidy itself was discussed inside the model. The subsidy channel of distribution through a captive bank system is an advantage of the state sector over the private sector. The subsidy is aggregate spending, hopefully domestic spending for the purposes of domestic accumulation. The subsidy is an existing insider social safety net. It is also a significant political interest which has strong incentives to frustrate attempts to reform state enterprises. A

social safety net removes the security argument for subsidy interests. However, profits collapse for state firms may leave these firms in need of working capital for proper adjustment. The subsidy and credit system must address this new market adjustment concern and not bankrupt firms with accumulated assets and labor that could adjust to serve consumers. In addition, subsidies to sectors of the economy which employ significant amounts of workers might be politically desirable to pay, using the insider social safety net argument.

For these reasons, the economic policymaker should act in more subtle directions. Cut subsidies politically carefully, and with sympathy for working capital, tax the incomes of labor, and end the tax to profits of capital. It then follows that reforming the captive bank system becomes a primary objective of the policymaker. These acts will also build a collective self-interest, which under democratic political conditions, can operate to address the subsidy system with respect to its overall effect on the economic community. The new private sector has efficient unit labor requirements and profit incentives. When supplied with capital, it can defend and expand its position in the competitive marketplace, create jobs, and enlarge a political constituency which has evolved under the dynamic market. In addition, press on with effective privatisation, and the state sector will adjust with the dynamics of profits towards the desirable goods consumers are willing to pay for.

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Chapter Three:

Dynamics and Depression in a Stable Two Sector Model of Transition

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Abstract

This chapter studies a two sector production macroeconomy, under disequilibrium transition from the command system. Facts on output growth in two production sectors, the state and private sector, show the output collapse generated after the command system regime ended in East Europe and Russia. Evidence is also presented for the critical assumption that authoritarian politicians used state subsidy to control the production of output. The model organizes and explains the collapse of output as a collapse produced by a market economy under dynamic disequilibrium adjustment. The reinvestment of profits determines the speed and success of the economic transition. The major result predicts, in the limit, in spite of the initial capital and labor allocation to the state sector, both the state sector and the private sector expand in a stable transiton to serve separate components of market demand. Under the market, the probable cause of collapsed output is then the lack of demand, or uselessness, of many state goods; and the *fait accompli* economic transmission into collapsed prices, collapsed profits, collapsed investment, payment arrears, and the sudden shedding of labor, as the final indictment of state production. Economic policy of privatisation, profits taxes, labor taxes, and unemployment benefits are also discussed within the context of the model.

1 Introduction

A market system claims to organize production with the decentralized instruments of incentives and constraints. If demand for a good does not match the supply, a price rises or falls, profits accumulate or decumulate, and private agents reorganize inputs of capital and labor to meet the most profitable opportunities. A command system claims to organize production, under subsidy, from a centralized bureaucratic organ. Demand is determined by the policy directives of government authorities. Capital accumulates, through government subsidy, under rationed guidelines to meet established demand policy. Management, motivated by bureaucratic incentives to maintain political control, and supported by Marxist ideology, hoards excess labor inside firms, in order to achieve the full employment objective of the state. A market system imposed on a former command system has never in history been attempted. When such a phenomenon began in East Europe, and spread into Russia, a subject of economic policy was opened and called transition economics [see Fischer and Gelb(1990) for an early treatment].

The first part of the transition literature, following regime changes in East Europe, responded to immediate macroeconomic issues like price liberalization, disinflation strategies, convertibility, and trade liberalization [see Lipton and Sachs(1990) for the Polish case]. A second part of the transition literature, following ongoing government reforms in East Europe and the collapse of the command bureaucracy in Russia, responds to the dynamic adjustment process underway in the physical economy. Command production strategies had ultimately led to unserved demand, corrupt networks between government bureaucrats and firms, and misallocated resources [see Shliefer(1988) on corruption]. This literature is dedicated to outlining solutions to reallocate resources and improve production through privatising and restructuring state enterprises, and attempts to illuminate phenomena like transformational recessions and long run growth out of the command system [see the 1993 Francois Perroux Lecture by

Janos Kornai for a nice treatment]. Most of both parts of the transition literature, however, has treated the effects of government led industrialism informally. This paper is motivated by an interest in providing formal analysis for the ongoing debate on the consequences of the adjustment process in production, capital, and labor from subsidized initial conditions. In addition, the formal approach addresses the informal debate about the prospects of privatisation strategy and subsidies, and examines the effects tax policy, and unemployment benefits, have on this abstract process of long run accumulation.

Section Two examines recent data on output and employment growth in eight countries in East Europe and in fourteen republics within Russia. Along with comments on the data, the section examines, in detail, the economic legacy of the bankrupt subsidy system uncovered up by economists at work on market reforms. Section Three models decentralized market adjustment, where one of the crucial assumptions captures the existence of two production sectors in the aftermath of the command system, each given the incentive to maximize returns on assets within the sector. One sector represents the state enterprises, and the other sector represents the emergent private enterprises. The model concludes that the disequilibrium path of adjustment is stable, with both sectors, in the limit, serving all demand. Section Four studies the comparative dynamics of the system to explain the facts of macroeconomics output collapse. Section Five analyzes the effects of privatization strategy within the model, and asks how government tax and unemployment benefits policy can be adjusted to speed up the dynamic adjustment process. Section Six, a summary, concludes.

2 The Facts

A. The Facts on the Macroeconomic Conditions of Transition Economies

Consider the initial collected facts on state sector and private sector macroeconomic growth conditions of the transition economies. The data for Central Europe is presented in the first table, found below. The data for Russia and the surrogate states are found on the following page.

Table 1: Total GDP growth and the Private Sector Share

Central Europe
(growth calculated from 1989-92, share in %'s)

State	Annual Growth (GDP)	Private Share (GDP)	Private Share (emp)	Private Share Growth (GDP)	Private Share Growth (emp)	Annual Growth Labor Prod.	Annual Growth Private GDP	Annual Growth NPriv GDP
Bulgar	-9	16	14	21	34	-10	10	-10
Croat	-17	19	12	31	16	15	9	-19
Czech	-6	20	16	49	139	-38	40	-8
Hungar	-5	25	-	18	-	-	12	-7
Poland	-5	48	51	14	5	10	8	-10
Romani	-11	26	22	19	54	-24	6	-13
Sloven	-5	20	23	24	14	9	18	-7

Source: EBRD

Table 2: GDP Growth and the Private Sector Share

Former Soviet Union
(growth calculated from 1989-92, share in %'s)

State	Annual Growth (GNP)	Private Share (GDP)	Private Share (emp)	Annual Growth Private (GDP)	Annual Growth Private (emp)	Annual Growth Labor Prod	Annual Growth Private GDP	Annual Growth N-Priv GDP
Armen	-14	37	37	46	33	9	25	-18
Belar	-3	8	4	12	31	-14	9	-4
Eston	-13	22	15	12	20	-7	-3	-15
Georg	-19	23	-	10	-	-	-12	-21
Kazak	-1	12	4	-7	10	-17	7	1
Latvi	-14	-	6	-	41	-	-	-
Lithu	-14	20	25	18	80	-35	1	-16
Russi	-7	10	5	24	44	-14	15	-9
Ukrai	-6	10	-	-	3	-	-3	-6
Uzbek	-4	7	24	-18	3	-23	-21	-2

Source: EBRD
Eston, Kazak, and Uzbek numbers: 91-92, 89-91, 91-92
Georg, Russi, and Ukrai numbers: 89-91

The reference for the private sector data is the European Bank for Reconstruction and Development Annual Economic Outlook, published in September 1993. The author collected data for eight countries in East Europe and fourteen republics in Russia, and compiled two measures of emergent private sector activity: The private sector share in gross domestic product(GDP), and the private sector share in total employment. The ultimate source for the data are national statistics and macroeconomic bureaus, the Vienna Institute for Comparative Economic Studies, the United Nations Economic Commission for Europe(UNECE), and the PlanEcon Review and Outlook. In reviewing the data, note the tables have missing data, with measures of private sector output in the surrogate muslim republics the obvious example.

Definition problems exist too. The United Nations introduced a new System of National Accounts for these countries in 1993. This accounting system defines four sectors in these economies: The corporate sector, which includes cooperatives, the government sector, the household sector, and the rest of the world. The corporate sector aggregates three kinds of firms: the private sector, cooperatives, and the state sector. To produce a three year time series from both samples, the author lists both private sector data and private sector plus cooperative data, where the latter is noted in parentheses. For the purposes of this paper, consider the state sector to be firms formerly or presently under government subsidy and the private sector to be firms not under government subsidy. The pre-1992 private sector consisted mainly of the self-employed, retailers, and small scale farmers. Cooperatives in both samples consist of firms who lease assets from state enterprises. Both samples do not include in the private sector state enterprises that were 'commercialized', that is, where owners and managers have not changed. Examples are leaseholders and foreign-owned firms in Poland; new cooperatives, small enterprises, and leasing arrangements in Russia; and business or other small cooperatives in Hungary.

Measurement error is also a serious problem. Agents in the unsubsidized

private sector do not report, or underreport, activities to avoid corporate tax payments and social security tax payments. For example, in Bulgaria in 1991, private sector data which includes 'irregular' activities was four times the official measure of 5 percent of GDP. In Hungary, private sector data, reported from 1990 tax returns and listed in the table, was 57 percent of GDP. Estimates which include 'irregular' activities state a private sector of 65 percent of GDP.[1] To summarize, the data suffer from numerous independent sources, missing facts, definition problems, and serious measurement error. All imply significant distortions exist in the tables. However, the data do reveal certain important regularities that are robust to region and, sometimes, to the time of reform.

For example, in 1989 through 1992, the tables for East Europe show Poland and Hungary with large private sectors established prior to the collapse of the command system. Poland maintained a large unsubsidized private agricultural sector and Hungary entered the period with substantial numbers of mixed ownership firms. Both economies experienced private sector growth from this large base. Other economies in East Europe began reforms with smaller unsubsidized private sectors. Yugoslavia allowed a small unsubsidized private sector in agriculture and services, and the successor states of Croatia and Slovenia show strong growth from this base. Bulgaria had some agriculture and artisan activities in the unsubsidized private sector and shows strong growth from this base. The economies of Czechoslovakia and Romania suffered under regimes which retained a comprehensive command system until the fall of the communists. Romania was considered the most centralized economy in East Europe; even cooperatives were subject to the central plan. Both economies have had strong private sector growth since the fall of the communists.

All the economies of East Europe, however, experienced negative total output growth during the period, a phenomenon dubbed by Kornai as the trans-

[1] 'Measurement of the private sectors contribution. Accounting for CPEs in transition: system related issues in measuring economice performance', World Bank(1992)

formational recession. Poland and Hungary, with the largest existing private sectors, have experienced the least decline in output. While the growth of the private sector GDP was positive for all the economies of East Europe, this growth has not outweighed the output loss experienced by the state enterprise sector. In addition to this, labor productivity growth in the private sector was negative for countries in East Europe with late reforms, and positive for those with early, more comprehensive reforms. This means private sector output growth was less than private sector employment growth for most countries in East Europe during the three year period.

The surrogate states of Russia desplay regularities too. Four of ten republics show positive private sector output growth: Armenia, Belarus, Lithuania, and Russia. Estonia, Georgia, Kazakhstan, Ukraine, and Uzbekistan show negative private sector output growth. In Kazakhstan and Uzbekistan, private sector output growth declined even more rapidly than the growth of state enterprises. In Kazakhstan, state enterprise growth was slightly *positive* during the period. By 1992, Estonia and Lithuania had the largest private sectors among the former surrogate states, at 22 percent and 20 percent respectively, although these fell short of the 35 percent and 42 percent levels achieved in Hungary and Poland. Comparisons on the share of the private sector in total employment in the surrogate states is too incomplete to exhibit regularities. Private sector labor productivity growth was negative for all surrogate states except Armenia, meaning growth in private sector GDP was less than growth in private sector employment.

Some qualifications with repect to the republics need to be stated. The data for Georgia, the author admits, are poor. In addition, Georgia has instituted land reforms to return 50 percent of agriculture to the private sector. The Baltic states and Russia have been the quickest to introduce and implement reforms among the surrogate states. The negative private sector growth in Estonia, the author admits, are subject to significant measurement error.

Combine the events of both regions and the common portrait of real adjustment appears. The combined economies exhibit negative private sector labor productivity growth, with the exceptions of Croatia, Slovenia, Poland, and Armenia. This means private sector employment growth outpaced the slower private sector output growth. The combined economies also exhibit negative total output growth, with negative state enterprise growth the contributor to the decline. The exception is Kazakhstan. To provide contrast, consider the significant, consistent positive private sector output growth in East Europe versus the inconsistent private sector output growth in Russia and its surrogate states. One might conclude, preliminarily, that the economies which have implemented reforms to leave the command system and its subsidies earliest have experienced the most significant private sector output growth. Therefore, *ex post*, economies new to the reforms can expect booms in the emergent private sector, and those economies where the command system remains in place, perhaps Kazakhstan, cannot expect an expansion in the emergent private sector.

These data reduce to three stylized facts summarizing the output collapse in the aftermath of Communism. One, the emergent private sector expanded rapidly in economies where it was been allowed to operate. Two, while the expansion in private sector output has been large, the private expansion has not been large enough to dominate the state enterprise sector output collapse, at the macroeconomic level. Three, the private sector expansion has not been able to maintain labor productivity.

B. The Facts on the Effects of State Subsidy

The state enterprise sector formed during the command system. Its negative output growth, exhibited in the tables on East Europe and the republics of Russia, suggest that legacies of the command system are important determinants of the long run growth possibilities of these economies. This paper abstracts from the many dimensions of the state enterprise production to focus on two

dominant imperatives of the command system. The first imperative is that state production eliminated outside interests. Second, state production required persuading managers to pursue the political objectives of the state bureaucracy. The economic direction of this system was then steered by the maintenance of a subsidy system. Below is a more detailed examination of the effects of these two imperatives.

The fact that planning eliminates outsider interests is initiated by a command bureaucracy which controls economic behaviour through rationed production and investment. In this system, prices and productive capital become irrelevant, and, therefore, the system eliminates the need for an agent to represent productive capital. Various authors label this economic pathology as absent outsider ownership, absent outsider principals, the equity governance issue, or the corporate control issue [see Carlin and Mayer(1992)]. The absent agent, and the substitute role created for command bureaucrats as the agent for rationed capital, has produced black market activity and critical missing institutions when an attempt to transform the state enterprises into corporate forms has been tried. With no agent for capital, managers and workers have incentives to decapitalize the firm through so-called 'nomenklatura' or 'spontaneous' asset confiscation, also known as theft. It has also led to excessive wage increases [see Sachs(1992) for the Russian case]. The absent agent also leaves managers with bargains to be made with command bureaucrats over rationed capital. After the collapse of the command system, managers continued to serve the demands of command bureaucrats, in exchange for subsidies, over the demands of product market customers. The absent agent for capital also led to the absence of modern market accounting, as there was no need to account for capital, the absence of bankruptcy legislation, as bankruptcy could not occur, and the absence of financial intermediaries, as there was no need to store or transfer productive capital.

The fact that planning requires managers to pursue political objectives re-

quired the bureaucrats in the command system to subsidize managers in the state enterprises. In return for the subsidies, the managers hired excess labor and located in inefficient places. The labor hoarding at the end of the command system measured 15-20 percent of the labor force in Hungary, 25 percent of the labor force in Poland, and 20 percent of the labor force in Czechoslovakia [see Burda(1992)]. At the end of the command system in Russia, this practice left firms with three possible ties to the command system. Some enterprises operated under direct subsidy from the reform government, as they did under the old command system. Other firms relied on sales to final goods customers for wage revenues and recieved a subsidy for other production costs from the government. Many of these enterprises contracted financial services to a financial monopoly called an association or capture bank. These banks supply a subsidy along with financial services to all firms in one industry, where the bank forces the firms in the industry to contract all financial services in exchange for the subsidy. The final group composes the emergent private sector, which recieve no subsidy [see Ickes and Ryterman(1993)]. In Russia in 1992, directed credits from the Central Bank were 21 percent of GDP, with agriculture, energy, and very large manufacturing firms the primary beneficiaries. Total subsidies from the government added up to an additional 21.6 percent of GDP, with import subsidies, energy subsidies, and subsidies for interest payments on already subsidized credit [see Boycko, Shliefer, and Vishny(1993)]. Clearly, the subsidy has been a dominant form of political control over the economic production structure. The next section of the paper organizes and studies these facts in the context of a two sector model of transtion.

3 A Model

This paper considers the long run real transition of economies which have experienced the effects of government subsidy on the factor markets and the final

goods markets of the state sector, in sudden transition to market competition with the new private sector to serve final goods demand. It offers a plausible explanation for the command system depression in the aftermath of price liberalization, and attempts to analyze the transmission of the demand collapse into the factor markets. In addition, this paper addresses the ongoing market demand, technical, and policy determinants of the speed of transition in the absence of subsidy. This section is dedicated to constructing a model which uncovers the underlying determinants of the speed of capital stock adjustment, in the absence of government subsidies, and offers an assumption which generates a stable long run equilibrium for the two sectors. Such modelling is useful for furthering future understanding of the real adjustment dynamics of transition in Russia, and for contemporary understanding of the present dynamics of transition in Central Europe [see Aghion and Blanchard, 1993, for more on the speed of transition in Central Europe].

To model a stable transition without subsidies, consider the following assumptions. Assume production remains constrained by the amount of capital available to each sector.

$$Y_i = min[\frac{K_i}{a}, \frac{L_i}{c}] \quad \forall i,j \tag{1}$$

$$= \frac{K_i}{a} \qquad if \qquad \frac{K_i}{a} < \frac{L_i}{c} \tag{2}$$

$$\Longrightarrow \qquad K_i = aY_i \qquad L_i = cY_i \tag{3}$$

$$\tag{4}$$

Assume each sector now makes production decisions under a hard budget constraint. Under the hard budget constraint, the profit rate is determined by the the price, the technology coefficients, and the wage. A formal demonstration is constructed below.

$$\pi \quad | \tag{5}$$

$$P_i Y_i = wL_i + \pi_i K_i \tag{6}$$

$$P_j Y_j = wL_j + \pi_j K_j \tag{7}$$

$$\Longrightarrow \pi_i = \frac{P_i Y_i - wL_i}{K_i} = \frac{P_i - cw}{a} \tag{8}$$

$$\Longrightarrow \pi_j = \frac{P_j Y_j - wL_j}{K_j} = \frac{P_j - cw}{a} \tag{9}$$

$$\tag{10}$$

Assume each sector hires labor out of a common market. Assume preferences are Cobb-Douglas, and that, during transition, the labor supply constraint is not binding, that is, $L_i + L_j < \overline{L}$ holds during the transition. The real wage, for efficiency wage, insider, or union considerations, will remain fixed at a constant level until the labor supply constraint binds in long run market equilibrium. This fixed real wage relation can be formalized in one simple relation shown below.

$$w = \beta P_i^{\alpha} P_j^{1-\alpha} \tag{11}$$

$$\tag{12}$$

Assume relative demand determines the amount of total spending allocated to the purchase of each good in each sector. Let α indicate the proportion of spending which falls on the i sector good. Then the following must be true.

$$P_i Y_i = \alpha(P_i Y_i + P_j Y_j) \tag{13}$$

$$P_j Y_j = (1-\alpha)(P_i Y_i + P_j Y_j) \tag{14}$$

$$\Longrightarrow \qquad P_i Y_i = \frac{\alpha}{1-\alpha} P_j Y_j \tag{15}$$

$$\Longrightarrow \qquad \frac{P_i}{P_j} = \frac{\alpha}{1-\alpha}\left(\frac{K_j}{K_i}\right) \tag{16}$$

$$\tag{17}$$

Let the capital goods be produced from both goods, i and j, so that their price is specified in the Cobb-Douglas form. For simplicity, assume the amount of relative demand for each good is identical to the amount of inputs demanded from each sector for capital goods production. Then:

$$P_k = P_i^{\alpha} P_j^{1-\alpha} \tag{18}$$

$$\tag{19}$$

Assume the rate of reinvestment of profits for each sector determines the speed of capital stock adjustment, and, therefore, the speed of real transition. This assumes each productive sector faces no possibility of external finance for capacity expansion, an assumption corresponding to facts for the new private sector, and appropriate for a state sector cut off from government subsidy. It also assumes that there is no dividend payment to outside shareholders, or coupon payments to creditors. Note that an increase in the price of capital goods will slow down the speed of capital accumulation.

$$\dot{K}_i = \frac{\pi_i K_i}{P_k} \tag{20}$$

$$\dot{K}_j = \frac{\pi_j K_j}{P_k} \tag{21}$$

$$\Longrightarrow \qquad \frac{\dot{K}_i}{K_i} = \frac{\pi_i}{P_k} = \frac{\pi_i}{P_i^{\alpha} P_j^{1-\alpha}} \tag{22}$$

$$\Longrightarrow \qquad \frac{\dot{K}_j}{K_j} = \frac{\pi_j}{P_k} = \frac{\pi_j}{P_i^{\alpha} P_j^{1-\alpha}} \tag{23}$$

(24)

This closes the model. Allow one normalization for either $P_i, P_j, or \ \ w$, then, using equations (1),(6),(11),(13), (18), and (20), construct the following relation for sector i. A reciprocal relation exists for the sector j.

$$\frac{\dot{K}_i}{K_i} = \frac{\pi_i}{P_k} = \frac{P_i}{P_k} - \frac{c\beta}{a} \tag{25}$$

$$\Longrightarrow \qquad = (\frac{P_i}{P_j})^{1-\alpha} - \frac{c\beta}{a} \tag{26}$$

$$\Longrightarrow \qquad = (\frac{\alpha}{1-\alpha}\frac{K_j}{K_i})^{1-\alpha} - \frac{c\beta}{a} \tag{27}$$

(28)

The following equations summarize the model. The first set of equations map the disequilibrium capital stock adjustment in each sector.

$$\frac{\dot{K}_i}{K_i} = (\frac{\alpha}{1-\alpha}\frac{K_j}{K_i})^{1-\alpha} - \frac{c\beta}{a} \tag{29}$$

$$\frac{\dot{K}_j}{K_j} = (\frac{1-\alpha}{\alpha}\frac{K_i}{K_j})^{\alpha} - \frac{c\beta}{a} \tag{30}$$

(31)

The final equation maps the binding constraint introduced by a fixed supply of labor. It is this binding constraint which, when reached, will conclude a stable disequilibrium transition by reinvestment in each of the two sectors.

$$L_i + L_j < \overline{L} \tag{32}$$

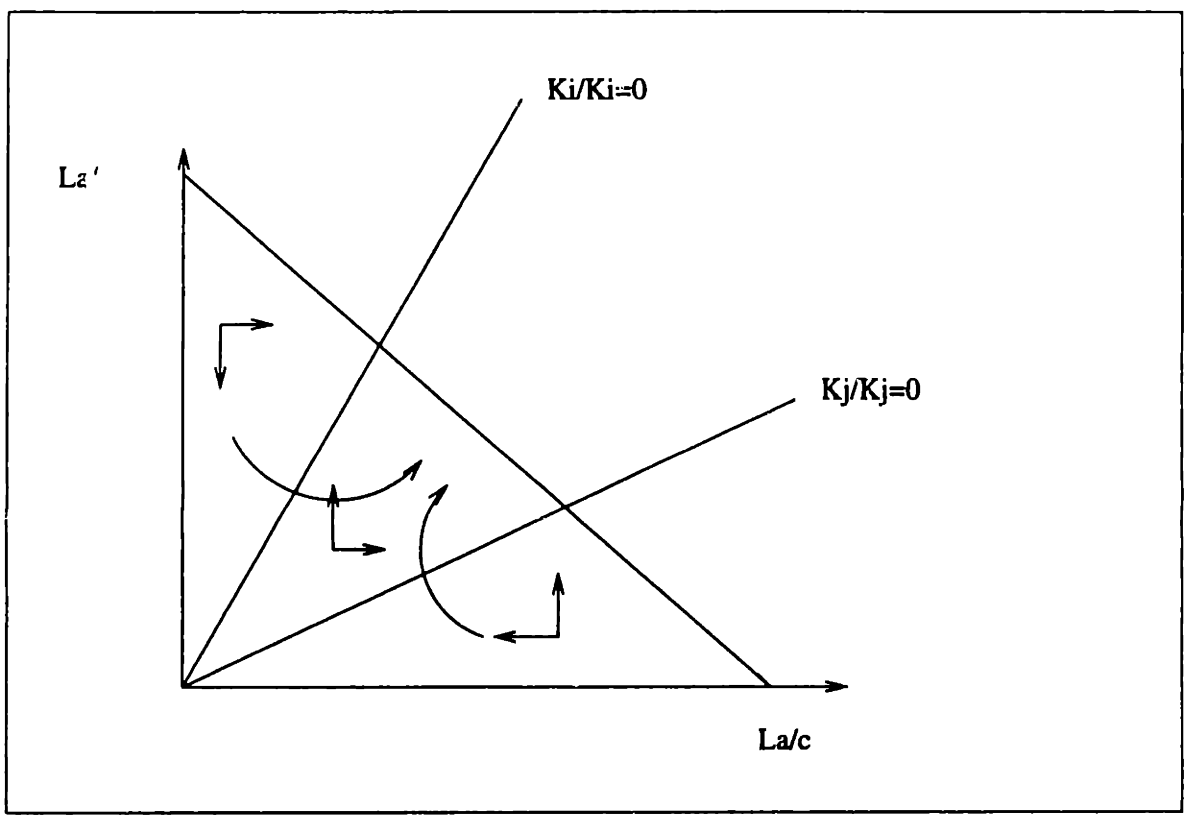
$$\Longrightarrow \qquad \frac{c}{a}(K_i + K_j) < \overline{L} \tag{33}$$

The more efficient capital is in producing output, indicated by the coefficient a, the slower the adjustment in both sectors, as less capital is required to produce the same amount of output, and the slower the rate of capital accumulation. If a private sector had more efficient capital utilization, then this would slow the speed of reinvestent for this sector and would slow the speed of real transition. The higher the fixed wage, the slower the adjustment will be too, as the workers direct more of the profits into wage demands and away from profits and therefore reinvestment. In the case of a state sector privatised to its workers, or in the case of strong unions, this effect, indicated by the coefficient β, suggests that the transition will be slower than it would be in the absence of such institutions. Analogously, the greater amount of labor required to transform labor into output, indicated by the coefficient c, the slower the adjustment will be. This suggests that state firms which produce with technology that requires alot of labor input will also see a slower speed of reinvestment and real transition in the aftermath of the price liberalization. Restructuring, by lowering c, is clearly necessary to speed the transition.

In addition, the relative demand for each good determines the speed of transition as well. The greater the demand for goods in one sector, the higher the price, the higher the profits, and the greater speed of reinvestment. Reinvestment is also increased by the proportion of capital demanded from the productive sector. The greater the amount of capital goods demanded, the higher the overall price for capital goods, and the slower the speed capital accumulation in the sector in transition. In this model, then, the transition speeds for each sector are determined, in the absense of government intervention, by the technology available to transform labor and capital, the demand and price level of capital goods, and the relative demand consumers have for the goods each sector produces. The stability result is a conseqence of the assumption of relative demand for different goods in each sector. This idea suggests that substitutability of goods is a key factor in determining the stability of the transition. If the

state sector produces goods which cannot act as perfect substitutes for the new private sector goods, then there will be a private sector, private sector profits, private sector reinvestment, and the emergence of a private sector in transition. The conclusion of such a transition will then display production activity in both sectors. Please turn to the following page for a graphical exposition of the argument.

A Stable Transition Under the Assumption of Different Relative Demand



4 Comparative Dynamics

The presented facts indicate the state sector collapsed, while the private sector expanded. This section is dedicated to uncovering some reasons for this result. Below is a study of the effects of the underlying determinants on the profit rate and capital accumulation.

[A] Profits in both sectors increase with the size of relative market demand α. If consumers increase their demand for a sectors goods, prices increase, and profits increase, and capital accumulates.

[B] High labor costs, captured by the wage variable β, and by the efficiency variable c, lowers own sector profits. If both sectors reduce β, and lower c, to reduce wage and unit labor requirements, then, under a competitive market, prices on final goods fall, and spending for both sectors will increase. Therefore, profits to capital, reinvestment, and capital accumulation for both sectors will rise.

[C] Profits fall in both sectors when either sector improves capital efficiency, captured by the variable a. Such improvements reduce unit capital requirements. The optimal strategy for maximum capital accumulation, for both sectors, is to maintain the existing capital stock efficiency.

[D] If capital accumulates in the other sector, unambiguously, the own sector profits rise. If capital accumulates in the own sector, relative profits rise in the other sector. The notion here is one of a relative demand spillover. An increase in demand in the other sector causes prices to rise in this sector. This raises profits, and increases the capital stock. The other sector price rises, however, causing the relative price relation between the two sector goods to favor the own sector. This increase simultaneously increases demand for the

own sector goods. This increase in demand then causes prices to rise in the own sector and profits and capital to collect in the own sector until the relative price relation between the other sector and the own sector is restored. This is the source of the stable transition result.

By looking at each of the determinants of the speed of capital accumulation in turn, we can identify the source of the output collapse.

In part [A], a strong hypothesis to explain the output collapse comes from the result that both firms profits depend on the relative demand for the goods produced by the two sectors. A sudden shift in this variable would produce a collapse in demand in one sector and an increase in demand for the other sector. If the demand for the output in the state sector falls, the price for these goods fall, profits on the capital invested in this sector falls, investment falls, and labor would be shed to maintain a solvent firm. This shift would initiate a symmetric story for the output of the private sector. If the demand for state sector goods falls, the relative demand for private sector goods rises, the price for these goods rises, profits on the capital invested rises, investment rises, and the private firm hires labor to serve the increased demand.

If there was a sudden shift to the market, and consumers decided state goods were useless, and the new private sector goods useful, then, both relative demand effects would compound the change, and cause a sudden collapse in output of the state firms, and a rise in the output of private firms. This would be accompanied by further transmission into a price collapse for the state goods, a profit collapse, an investment collapse, payment arrears, and a need to shed labor to remain solvent...or demand greater subsidies. Simultaneously, the private sector would see output boom, prices increase, profits increase, investment boom, and labor force hiring. If the collapse in state sector demand was greater than the rise in private sector demand, then there would logically be negative overall output growth and negative labor productivity in the new private sector, as the workers

in the state firms who were dismissed would be counted as members of the new private sector.

In part [B], higher labor costs, and corresponding higher unit labor requirements in the state sector would reduce profits for that sector, lower investment in the sector, and slow adjustment. Such an effect has a symmetric lowering of profits for the private sector. Reducing labor costs and increasing profits and capital accumulation for both sectors could be part of an adjustment story. However, this is a long run adjustment effect, and it is not likely to account for the sudden collapse in output.

In part [C], neither firm has an incentive to improve capital efficiency for the purposes of capital accumulation, and reduce unit capital requirements, so this is not going to explain the facts.

In part [D], the partial effect of an increase in capital states that an increase in accumulated capital in the competing sector increases the profit rate of the sector which did not recieve the capital. As an explanation of private sector growth and old state sector collapse, it must be rejected.

The relative demand hypothesis is entirely consistent with the facts and must be provisionally accepted as the underlying ultimate determinant of output collapse. In some sense, after a political collapse, and higher unit labor and unit capital costs, and a distorted capital allocation, the *fait accompli* of the socialist subsidy system was surely the useless value of the products produced by state firms, which under a sudden adjustment to dynamic market capitalism, leads to output collapse, and, if enough of the goods are useless, to depression. This seems to be the case in the command systems of East Europe and Russia. Whether such uselessness corresponds to the capital stock is a critical question to explore. One can only hope positioning of a significant amount of useful state sector capital to serve market demand for desirable goods is somehow possible in a short time period.

5 Economic Policy

A. Replacing Profits by Privatization

Part [B] identified labor costs as one possible cause for the absent adjustment in the state enterprise sector. By assumption, state enterprises claim higher unit labor and unit capital requirements, and under worker ownership or unionization, they will also pay higher wages, than the private sector. The model concludes that this combination of high costs will depress profits. Significant amounts of surplus labor, such as the 20 to 25 percent of the labor force, inherited as surplus workers from the command system, would significantly depress the profits to capital in the state sector. To allow the state sector to compete in decentralized markets, the managers of state firms must therefore have authority to fire workers. In a capitalist market system, restructuring authority is granted by an outside agent of capital, typically called stock holders. These agents, who claim the profits of the firm, elect a board of directors, whose mandate is to maximize shareholder profits. The board of directors then hires managers with incentives to organize the productive operations around the objective of maximizing shareholder profits.

With dynamic adjustment and accumulation in mind, transition governments promoted privatization strategies to organize outside interests whose mandate was to protect and to accumulate state sector capital stocks. However, instead of granting outsider interests authority over enterprises, government privatisation strategies of East Europe and Russia display a strong bias toward internal control. In Poland, Hungary, and Czechoslovakia, government began privatisation by consulting with ministries, worker councils, and management, before setting the privatization agenda. As a result, insiders, the managers and workers, kept majority ownership in firms. The assets of firms were then often lost through theft, wage increases, and stalled labor reductions, and the overall

speed of privatization was slowed down. In Poland, it took almost a year to select five large companies for privatisation [see Sachs(1992) for details].

After this, Poland designed a Mass Privatisation Program, where investment funds manage holdings of outsider claims on firms attained through voucher programs. These investment funds are supposed to act as the agent for capital, and the government plans to establish 10 or 20 of these funds. The government will allocate 33 percent of shares to a single fund, 27 percent to other enterprises, 10 percent to insiders, and 30 percent will be kept by the treasury. Housholds purchase shares, or vouchers, for a nominal fee [see Carlin and Mayer(1992)].

In Czechoslovakia, the pace of privatization has been equally slow. For large firms, the government plans to convert ownership as well, with 3 percent assigned to the National Property Fund, 5 to 10 percent to foreign firms or individuals, and the rest of the claims distributed through vouchers to households. The cost of a household voucher booklet is about a weeks wage. These vouchers can be placed in over 500 investment funds, where a small number of funds have acquired the great majority of vouchers. Polls suggest 40 percent of vouchers remain in the investment funds [see Carlin and Mayer(1992).

In Russia, privatisation did not follow the models in Poland and Czechoslovakia. The Russian Mass Privatisation Program allows managers and workers to choose one of three ownership divisions: One, 5 percent of shares to managers, at a nominal price, 25 percent to workers, which were non-voting, and 10 percent to both, in a sort of ESOP. Two, 51 percent to managers and workers, at the price of 1.7 time the book value of 1992 assets. Three, 40 percent to managers, in the form of stock shares at low prices. The rest of ownership went to outsiders through vouchers. At this stage, insiders have chosen plan two 78 percent of the time and plan one 21 percent of the time, with capital intensive firms or those with poor relationships between managers and workers choosing plan one. After active secondary markets, closed subsriptions, and ESOPs, managers and workers have achieved control of 70 percent of shares on average.

In a finer breakdown of ownership, 17 percent have gone to managers, with 7 percent to CEOs, 14 percent to outsiders, with 9.5 percent to blockholders, and 16 percent to the Property Fund, with 10 percent transferred by ESOP to insiders in the future [see Boycko, Shliefer, and Vishny].

In East Germany, the state privatisation agency, the Truehandanstalt(THA), supervised the task of restructuring the state enterprises. The agency has created boards of directors to monitor management, to evaluate enterprises and adjust balance sheets, to reorganize or close firms, to find and evaluate buyers, and to impose employment and investment targets. As an example of the importance of the outside agent for capital, one of the THA's first actions was to recruit thousands of West Germans to chair supervisory boards. Employee representatives were placed on boards after being elected by works councils. Employees of banks made up 20 to 25 percent of the directors, local authorities made up 10 to 15 percent of the directors, and other company executives made up 60 to 70 percent of the remaining directors. When firms were sold, 5 percent have gone to non-German foreign buyers, 18 percent to management, and 77 percent to West Germans companies. In addition, the West German government has invested in 1992, an annual 95 billion DM out of the 180 billion DM allocated to East Germany in the form of public sector capital spending, investment grants, interest subsidized loans, and tax concessions [see Hare and Hughes(1992)].

What does this mean for capital accumulation? An organized agent for capital in the state sector has not established authority over assets in any country other than East Germany. Poland and Czechoslovakia plan reframe privatisation policy to address the problem of surplus labor and worker ownership, which reduces capital accumulation. The problem remains unsolved in the other economies, and the effect has been to slow accumulation in the state sector, compounding the negative effects of the demand collapse.

B. Public Finance and Unemployment Benefits

To consider the use of public finance and unemployment benefits in the model, the following equations define, respectively, a profits tax, a labor tax, and an unemployment benefit, for those members of the labor force unable to find work. These additional equations are necessary in order to integrate economic policy into the dynamic transition framework constructed above.

$$\pi_i = (1-t)P_i - w \tag{34}$$

$$w = \beta(1-t)(P_i^{\alpha} P_j^{1-\alpha}) \tag{35}$$

$$t(Y_i + Y_j) = bL_u \tag{36}$$

$$\tag{37}$$

Under dynamic transition, a profits tax could slow the accumulation of capital. This is shown for sector i below. Sector j will produce a similar result.

$$\frac{\dot{K}_i}{K_i} = \left(\frac{P_i(1-t)}{P_j}\right)^{1-\alpha} - \frac{c\beta}{a} \tag{38}$$

$$\frac{\dot{K}_i}{K_i} = \left(\frac{P_i}{P_j(1-t)}\right)^{1-\alpha} - \frac{c\beta}{a} \tag{39}$$

$$\tag{40}$$

If the profits tax falls on sector i goods, then sector i transition will slow with respect to sector j. If the profits tax falls on sector j goods, then sector i transition will speed up with respect to sector i. However, if the profits tax falls on both sectors goods, in equal proportions, then there will be no effect on the speed of transition. In summary, only differences in profits taxes across sectors can speed or slow the adjustment in one of the sectors.

Consider the effect on reinvestment and dynamic transition if there is a labor tax.

$$\frac{\dot{K}_i}{K_i} = (\frac{P_i}{P_j})^{1-\alpha} - \frac{c\beta(1-t)}{a} = (\frac{P_i}{P_j})^{1-\alpha} - \frac{c\beta}{a} + \frac{c\beta t}{a} \tag{41}$$

A labor tax can create spending for the unemployed and raise the amount of capital formation in transition. Clearly, this is a useful approach, and the model suggests to the policymaker that the imposition of a labor tax to pay for unemployment benefits is the proper means of government intervention in the decentralized market transition, as it will speed up, not slow down, the speed of transition.

Further examination of the final equation, the amount of taxation necessary to finance unemployment benefits, also reveals some interesting thoughts on the role of government finance and intervention in the market transition.

For the profits tax, the level of tax is determined by the following equation.

$$t = \frac{bL_u}{a(K_i + K_j)} \tag{42}$$

A higher level of unemployment benefits, or a higher level of unemployed, will raise the amount of taxation necessary to finance the benefits program. In addition, better capital transforming technology, and a greater amount of capital in either sector will lower the level of taxation. This suggests that the early stages of transition, where there are many unemployed workers, and there is little output, and therefore little capital and profits to tax, will be a period when the government finance role will be the most onerous to the speed of capital accumulation.

For the labor income tax, the level of tax is determined by the following equation.

$$t = \frac{bL_u}{c(L_i + L_j)} \tag{43}$$

Again, the higher the level of unemployment benefits, and the higher the number of unemployed workers, the greater the level of taxation. In addition,

the greater the number of workers employed, and the less able the firm is to transform labor into output, the lower the level of taxation. This suggests that early in the transition, there will be many unemployed, and few employed in the private sector. This will slow transition. However, the lack of restructuring in the old state sector would allow the government to tax more of the incomes of state workers. This will speed up transition. This suggests that there is a mixed case to the effects of government finance under a labor tax assumption in the early stages of transition in this no subsidy transition model.

Under the following analysis, the effects of government finance will be most onerous if the government taxes the profits of the flourishing new sector more than the declining old sector, and if the government taxes earlier in the transition, with corresponding high demand for unemployment benefits, and little capital and production to tax, than later in the transition. A labor tax could be a benefit early in the transition, although the model is analytically ambiguous about this.

6 Summary

Recent data show rapid expansion of a new private sector in former command economies. The private sector is larger, and grew faster, the larger the private economic base established prior to reforms of the state sector. Economies which began state sector reforms earliest exhibit the most robust new private sectors. In spite of this expansion, though, the overall level of output in former command economies fell, as the collapse in output in the old state sector dominated the rise in output in the new private sector. Finally, the new private sector exhibits negative labor productivity growth.

A model explained this process as a disequilibrium adjustment under a competitive market with two sectors, a private sector and a state sector. The simple result expressed by the logic is that the significant economic legacies of the for-

mer command system create negative and positive effects on the speed and magnitude of disequilibrium adjustment. The focus on production of certain types of goods, worker ownership, the high unit labor requirements in the state sector after subsidy, and the profits tax, create negative effects on the speed and magnitude of disequilibrium adustment. The endowment of productive capital is a positive initial condition inherited by the state sector. The negative legacies of state led industrialism have dominated the positive legacy of productive capital in determining the sign and speed of the initial direction of the path of capital accumulation.

The facts indicate the new private sector expanded and the state sector collaped in the face of market discipline. A comparative dynamics analysis of the other determinants in the model conclude that the factually consistent explanation for the collapse of the state sector and the simultaneous rise of the private sector has been a sudden shift in relative demand for the sets of goods each sector produces. The state output collapse suggests that consumers decided a number of state produced goods were useless. The larger number of goods deemed useless, the larger the decline in output. This demand discipline led to a price collapse for the state sector, a profits collapse, an investment collapse, payment arrears, and shedding of labor to maintain solvent state firms. Symmetrically, consumers deemed private goods desirable, the private sector witnessed a sharp rise in demand for private goods, a price rise, profit increases, accumulation of investment capital, and hiring of labor to produce the new goods. However, the collapse of demand for state goods dominated the increase in demand for private goods, so there has been negative labor productivity counted in the private sector, as shed workers in the state firms attach to private firms for survival.

A section discussed reform measures which might speed adjustment of the state subsidy firms. Privatisation returns the profit motive to the state firms, and this will ultimately drive down the inefficient high wages and unit labor

requirements, as the costly hoarded labor depresses the profits to capital. The agents of labor have contributed to the slow adjustment of state firms, and, combined with the demand collapse, dominated the positive advantage of accumulated capital for the state sector. While privatisation remains a sound platform for restructuring firms, investigating the existing conditions of reforms which privatize state enterprises suggest that the objective of maximizing the stockholders return to capital invested is not yet the primary objective for a majority of firms emerging from the command system, as it has been the inside agent of labor which has been installed, not the outside agent of capital.

Profit taxes, labor taxes, and unemployment benefits were also discussed inside the model. A profits tax of an equal level levied on each sector will have no effect on the path of accumulation. An unequal tax will benefit whichever sector does not pay the tax. A labor tax will introduce the positive effect of the unemployment benefit. Under a labor tax, the unemployment benefit acts as aggregate spending, hopefully domestic spending for the purposes of domestic accumulation. The public finance effects are likely to be most onerous to the speed of transition during the early stages of reform rather than the later stages of reform. In addition, a profits collapse for state firms may leave these firms in need of working capital for proper adjustment. The subsidy and credit system must address this new market adjustment concern and not bankrupt firms with accumulated assets and labor that could adjust to serve consumers. In addition, subsidies to sectors of the economy which employ significant amounts of workers might be politically desirable to pay, using the insider social safety net argument.

For these reasons, the economic policymaker in the government should act in subtle directions. Implement an effective agent of capital, tax the incomes of labor, and end the tax to profits of capital, and install an unemployment benefits system. The new private sector has efficient unit labor requirements and profit incentives. When supplied with capital and proper incentives, and not hindered by too onerous requirements of financing the governments benefits program,

it can defend and expand its position in the competitive marketplace, create jobs, and enlarge a political constituency which has evolved under the dynamic market. In addition, with a priority on effective privatisation, the state sector will adjust with the dynamics of profits towards the desirable goods consumers are willing to pay for. The unemployment benefits program is spending and a means to ameliorate the negative effects of the demand collapse for state sector goods, the sudden labor force shedding, and the continuing market determined imperative for more labor force shedding from the state sector firms.

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Chapter Four:

An Application of Game Theory to Explain Transfer Payments in Twenty Rich Democracies

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Abstract

The paper is organized to explain the pattern of subsidies and transfers under a democratic state of nature. The overarching assumption is that the allocation of transfers can be explained by a game played between the officeholder, who maximizes collective welfare by adjusting subsidies and taxes, and the polity, who provide campaign contributions and votes to the officeholder in exchange for a subsidy. The determinants of contributions and votes are studied under conditions of no lobby formation, a polity partially organized into lobbies, and a polity fully organized into lobbies. The outcome of substitution of voter reaction functions for contributions reaction functions as an explanation for transfer performance under a fully organized polity appears to capture most dimensions of the facts in the twenty country sample taken in 1992. The partially organized model may explain the dynamic evolution which preceded the fully organized polity. The contributions determinants may play a causal role when there is no vote preference in the objective function of the officeholder.

1 Introduction

The theoretical and empirical connection between Democracy, pressure groups and transfer payments has seen a long and distinguished set of contributors, beginning with Schumpeter[1947], and continuing with Downs[1957], Buchanan and Tullock[1962], Olsen[1965],[1982], Niskanen[1971], and Becker[1983],[1985]. It continues to be an active field of research. For a contemporary summary of the data, the collected set of explanations, and their status, with respect to econometric tests, see Mueller[1989]. Recently, work by Lindert [1994], has contrib[illegible] some historical background to the origins of redistribution by government. Lindert claims the state transfer phenomenon started with the early nineteenth century Poor Laws, and continued through to the minimal state transfer practices, seen first in Denmark, in the later nineteeth century, and then, in the early twentieth century, under the unstable but democratic Weimar Republic in Germany, and the unstable but democratic Irish Republic, after the WWI. New data and tests collected by Lindert suggest that the conventional Wagner's Law explanation: of income growth causing the rise of state transfer spending, played less of a role in shaping state transfer activity than did the practice of democracy, demography, and religion.

This author, inspired by the introduction of new tools for the analysis of political economy, seeks to apply these tools to build on the approach of Becker[1983], and examine the implications this new formal framework has for explaining a data set of twenty rich democracies 1972-1991. This approach,

developed by Bernheim and Whinston[1986], views the economic relationship between a government and individuals, under a democratic state of nature, as a non-cooperative game. A delegated common agent, called the government, and a set of principals, called the polity, *play a game* to determine the level of subsidies granted to each individual, and the level of contributions and the number of votes bought by the government. The tools have already been applied fruitfully to other political economy issues, by a number of international economists. In the political economy of trade literature, see Grossman and Helpman[1994], for a leading example, and Rodrick[1994], for a summary of research. For those interested in non-democratic states in transition to democracy, see Shliefer and Vishny[1994]. Five sections organize the paper. Section one: An Introduction presents a background of previous research. Section two: The Facts of Transfers in twenty rich democracies outline effects of the phenomenon for four sets of individuals. Section three: The Model Assumptions explain allocations between a hypothetical government and the individuals operating under a democratic state of nature. Section four: Transfer Game Analytics use the model assumptions to explain current transfer activity in the twenty rich democracies of the presented sample, and in democratic states, in other periods of time, past, present, and future. Section five concludes with a Summary Statement. Game on.

2 The Facts

Consider a state 'rich' if the government spends on foreign aid. Consider a state 'democratic' if elections, not heredity, or war, determine ultimate authority over all individuals in a common state of nature. Then, the set of nations which meet these criteria are twenty in the world from 1972-91. The data on transfer payments to domestic individuals, made by the twenty rich democratic governments, is drawn from the IMF Government Finance Statistics Yearbooks. The data on transfer payments made to foreign individuals, through their governments, called foreign aid, is drawn from the OECD Development Assistance Commission Annual Reports. The IMF reports five categories of current transfer expenditures: Total, State and Local Government, Household, Industry, and Transfers Abroad. Sub-items are also reported, but the data are not complete. The DAC report foreign aid is substituted for the IMF category Transfers Abroad to remove the military aid which Transfers Abroad includes. In addition, the IMF reports a Total Current Expenditures figure, which includes current government expenditure on goods and services. Express allocation of expenditure, under the annual government fiscal budget constraint, as:

$$\sum_{i=1}^{5} S_i + G \tag{1}$$

Measure the effective pressure on government budgets by time differencing the ratio of the transfer level in one category over the total transfer expendi-

ture. This total includes current government expenditure on goods and services. Express the pressure measurement, in percentage terms, as follows.

$$\frac{S_i}{\sum_{i=1}^{5} S_i + G} * 100 \tag{2}$$

Four tables, below, report the allocation measure and the related pressure indicator. Refer to the appendix for complete twenty year time series of each country and category. Table one compares the percentage of 1991 transfer expenditures out of total current budget expenditures. Table two reports the percentage of governments which experienced, from 1972-1991, an increase in total transfer expenditures. Minimal variation within an individual government over the twenty year period leaves the twenty year period measure robust to changes in start and end date. To review variation across governments, Table three presents a subset of Germany, Japan, and USA. Table four presents a Scandinavian subset.

Table One: Percentage of Total 1991 Government Expenditure

Total	Household	Intra-govt	Industry	Foreign Aid
54	33	13	7	1

1991 data show over one half of government expenditure, on average, goes to transfer expenditures. A large percentage of government expenditure goes, in order of magnitude, to households, to state and local government, to industry,

and to foreign aid. This order is robust to changes in reported year.

Table Two: Percentage of Governments Who Experienced Category Expansion 1972-91

Total	Household	Intra-govt	Industry	Foreign Aid
65	64	30	20	0

Pressure to increase allocations preserves order in total expenditure. This suggests a dynamic political and economic process produced the level of transfers, over time. These forces still work, today, operating in the same direction.

Compare these figures to subsets within the sample to study the variance in activity across governments. The author presents figures for Germany, Japan, and the USA. A second table presents figures for Scandinavian countries, which conventional wisdom assumes transfers policy sees its maximum application.

Table Three: Percentage of Total 1991 Government Expenditure

Country	Total	Households	Intra-govt	Industry	Foreign Aid
Germany	59	37	9	12	1
Japan	55	5	45	4	1
USA	57	44	9	3	1

The German government supports industry through subsidy more than the

Japan and USA government. The Japan government holds the minimum of household expenditure and the maximum of intra-government expenditure, for the entire sample.

Table Four: Percentage of Total 1991 Government Expenditure

Country	Total	Households	Intra-govt	Industry	Foreign Aid
Denmark	38		4		2
Finland	69	21	21	26	1
Norway	75	40	18	15	2
Sweden	15		2		2

Norway holds the maximum of total expenditure, for the entire sample. Finland holds the maximum of industry expenditure, for the entire sample. Denmark, Norway, and Sweden, along with Portugal, hold the maximum value of foreign aid expenditure, for the entire sample. For household expenditures, the Scandinavian countries fall near the mean, where Sweden stands as the low measure exception.

In summary, the transfer data, from twenty rich democracies, suggest a recognizable pattern: a strict ordering, across time, from the large allocation to households, to state and local government, to industry, and a small allocation to foreign aid. Further, the direction of increase, an indicator of pressure, preserves order in the allocation rank. The implication: strong, consistent, underlying forces create the allocations among groups. These forces increase

benefits to large groups, at the expense of small, or unrepresented groups. The next section(s) aim to formalize an argument and isolate the hypothetical, but plausible, forces generating the transfer allocation process.

3 The Model

This section models the transfer practices of a hypothetical democracy. The next section analyzes the implications of the model for representative democracies. The broad null hypothesis is this: transfer practices represent the outcome of an underlying, non-cooperative, game. This game is played between the individuals, in the polity, and a common agent, the simple government, which the individuals delegate the authority to redistribute income, among, and, possibly, outside the polity. This inquiry does not justify redistribution to individuals, to level unequal, market-determined, incomes, or explain the effect of redistribution upon individual economic properties, like the effort to do market work, or the will to seek market employment. Rather, the inquiry attempts to better understand a hypothetical political allocation process under a democratic state of nature.

The non-cooperative game has two sets of players: One, individuals in the polity, considered principals in the non-cooperative game. Two, government, considered a delegated, common agent. Assume the principals elect the common agent and charge her with authority to, costlessly, transfer and tax, amongst the

set of principals, and, meet a fiscal budget contraint each period of the game. Assume there are no 'hidden' taxes, such as appropriation, or 'hidden' subsidies, such as lax market regulation. Assume an inert form establishes the democratic authority, such as a constitution, and this inert form always existed. Assume, upon collecting payment from the common agent, each principal reciprocates, and contributes to the common agent some fraction of non-market income. The common agent use contributions to finance campaigns for reelection, and deter competitors. Once a non-market payment is made to a subset of individuals, the individuals have incentives to form a common lobby. This lobby can costlessly solve the free rider problem, and increase the effectiveness of political contributions, which means lobbies increase individual subsidies.

The redistributive outcome is determined by a struggle: a Nash equilibrium between the individuals, in lobbies, seeking to maximize their individual welfare, and the democratic government, operated by the common agent, seeking to maximize collective welfare and keep the office. The individuals provide votes and contributions to the common agent. In exchange, the individuals receive a transfer payment from the government. In the game, then, this non-market exchange is a Bernheim and Whinston *auction*: The *menu* is transfers to individuals, the *first price* is the optimal allocation given the stated objective of government, and the *return* to the common agent, within government, is counted in votes and contributions. This closes the basic set of restrictions on players, action spaces, and payoff functions.

The following player notation expedites precise exposition of the argument.

A. Player Notation

$Q = N + 1$	The government, or common elected agent
$i = 1, \ldots, N$	The number of individuals, or principals
$\mathcal{I} \equiv \{i\}_{i=1}^{N}$	The polity, defined as the sum of individuals
$I \subseteq \mathcal{I}$	The lobby, defined as a subset of individuals who collect a common payment
$\bar{I}$	The lobby complement

B. Individual Specification

After player identification in the non-cooperative game, individual payoff functions must be specified. These payoff functions map the set of government strategies, S, which represent total government transfers to the individual, into the set of individual returns, R. Assume individuals are identical, risk neutral, and seek to maximize a linear set of gross payments. This gross payment includes market income, L, transfer income, S, and taxes, T. Assume individuals contribute, C, to the common agent in government, in exchange for the transfer payment. Consider entities such as industry groups, and state and local governments, as aggregations of identical individuals. Then the following payoff functions hold.

$W : S \rightarrow R$	Individual gross welfare
$C : S \rightarrow R$	Individual contribution to government

Under the assumptions of risk neutrality and gross payment maximization, then, for each individual, i, individual gross welfare, w_i takes the following form:

$$w_i = l_i + s_i - t_i \qquad \forall i \tag{3}$$

such that

$$l_i \geq 0, \qquad s_i \geq 0, \qquad t_i \geq 0 \tag{4}$$

These restrictions allow only nonnegative payments to individuals.

However, gross income does not include the reciprocal payment made to government in exchange for the transfers. Net income includes individual contributions to government in exchange for the transfer. Assume these contributions increase in the proportion of transfer income out of total individual market and non-market income. Therefore:

$$c_i(s_i) = c_i(\frac{s_i}{l_i + s_i}) \qquad \forall i \tag{5}$$

Further, assume the contributions function is concave in the proportion of transfers, and the contribition function is feasible. That is, contributions have dimin-

ishing returns, the contributions are nonnegative, and the contributions must not exceed the amount of the transfer itself.

$$c_1 \geq 0, \qquad c_2 \geq 0 \tag{6}$$

$$0 \leq c_i \leq s_i \tag{7}$$

$$\tag{8}$$

It follows that gross welfare minus contributions measures net individual welfare, n_i.

$$n_i(S) = W_i(S) - C_i(S) \qquad \forall i \tag{9}$$

This completes the individual specification of payoffs.

C. Government Specification

After individual specification of payoffs, it is necessary to specify the government's payoff function in the non-cooperative game with the individuals. The government is assumed to map the strategy space of both transfers, S, and taxes, T, into returns, R. This government is an incumbent government. It is also assumed to be partly 'benevolent', and partly 'democratic'. These combined notions translate into a government objective function, with separate weights placed on the welfare of the set of individuals, I, and on the capacity of

transfers to buy votes from individuals for support in the next election.

More formally:

$D : T, S \rightarrow R$	the government welfare function
$V : S \rightarrow R$	the voter support function

For tractability, assume the government budget must balance, and transfers and taxes are non-negative and feasible. Assume the transfer budget balances and assume the deadweight costs to transfer income from one taxed group to another subsidy group, ala Becker[1983], sum to zero. The model will not consider the fiscal effect of government spending on goods and services; so the model restricts government spending to equal zero. The model implications are robust to this omission.

Then:

$$s_i \geq 0, \qquad t_i \geq 0 \tag{10}$$

$$s_i \in S, \qquad t_i \in T \qquad \sum_{i=1}^{N} s_i = \sum_{i=1}^{N} t_i \tag{11}$$

$$G = 0 \tag{12}$$

$$\tag{13}$$

The gross welfare function of the government, with respect to each individual, operating under the stated assumptions of 'benevolence' and 'democracy', takes

the following form:

$$d_i(S) = an_i(S) + bv_i(S) \tag{14}$$

where voting behaviour is characterised as follows:

$v_i(S) = 1$ if $s_i \geq k$

and

$v_i(S) = 0$ if $s_i \leq k$

for some constant k.

The following definitions are necessary to clarify exposition in the non-cooperative transfer game. These definitions aggregate the gross welfare functions of the government, and place each individual with a corresponding lobby.

$$\forall s \in S, \qquad \forall i \in I, \qquad I \subseteq \mathcal{I},$$

$$D_I(S) = \sum_{i=1}^{I} d_i(S) \tag{15}$$

$$V_I(S) = \sum_{i=1}^{I} v_i(S) \tag{16}$$

$$W_I(S) = \sum_{i=1}^{I} w_i(S) \tag{17}$$

$$C_I(S) = \sum_{i=1}^{I} c_i(S) \tag{18}$$

$$\tag{19}$$

Thus, to derive the net lobby welfare, N, and the gross welfare function of the government, D, both with respect to lobby I, we have the following equations.

$$N_I(S) = W_I(S) - C_I(S) \tag{20}$$

$$D_I(S) = aN_I(S) + bV_I(S) \tag{21}$$

$$\tag{22}$$

For the government, with repect to all individuals, and normalizing for the size of the polity, we have:

$$D_N(S) = aN_N(S) + b\frac{V_N(S)}{N} \tag{23}$$

Adding together, we derive the objective function of the government:

$$D_N(S) = a[W_N(S) - C_N(S)] + b\frac{V_N(S)}{N} \tag{24}$$

This closes the specification of the government.

The final task remaining before the model specification is complete is to identify the conditions of Nash equilibrium in the non-cooperative game. These equilibrium conditions are extracted from Bernheim and Whinston[1986] for a more general class of many principal- one agent games. The specific restrictions imposed on the individuals, the lobbies, and the government, above, do not

violate the generality of the equilibrium conditions stated below.

A 'first price' menu auction is then when government chooses to maximize Z^* such that:

$$Z^* \qquad (c_I)_{i=1}^N \equiv argmax_{s \in S}[D_N(S) + C_N(S)] \tag{25}$$

The Nash equilibrium necessary and sufficient conditions are then [1]:

1. C_i^0 is feasible $\forall i$
2. $s^0 \in Z^*$ given $s \in S$
3. $n_i(s^0) + D_N(s^0) + C_N(s^0) \geq n_i(s) + D_N(s) + C_N(s) \qquad \forall i \qquad s \in S$
4. there exists $s_i \in Z^*$ such that $c_i(s) = 0 \qquad \forall i$

4 Transfer Game Analytics

This section puts assumptions introduced in the previous section to use, to derive conclusions for the behaviour of individuals who collect income transfers from a government operating from a democratic state of nature. These individuals, and the delegated common agent placed at the democratic state of nature, must satisfy the Nash conditions for equilibrium stated by Bernheim and Whinston. These conditions are presented in this paper at the conclusion of the previous section.

[1] Please refer to the Bernheim and Whinston paper for proof of necessity and sufficiency

The first part of the section derives the strong result that a Nash equilibrium is necessarily the individual maximization problem. Then, the author performs the individual maximization, discusses the first order optimum, and graphs this optimum. Discussion follows. Individual maximization in lobbies becomes the next analysis. This is done by specifying the government first price menu auction for two tractable cases of transfer conditions. The first case transfers income to a subset of individuals. These individuals form a lobby, and exploit government preferences. Meanwhile, all remaining individuals in the polity stay unorganized. Discussion, with reference to the influence of partial organization on the individual contribution schedule, follows. The second case transfers income to two subsets of individuals, who form non-overlapping lobbies to exploit government preferences. No individuals in the polity remain unorganized. Discussion, with reference to the fully organized struggle for transfers upon the individual contribution schedule, concludes the section.

A. Necessary and Sufficient Conditions for Nash Equilibrium

Necessary condition (3) for a Nash equilibrium translates into the following static constrained maximization problem.

$$MAX_{s_i} \qquad l_i + s_i - t_i - c(\frac{s_i}{l_i + s_i}) + D_N(S) + C_N(S) \qquad (26)$$

The first order condition for this problem becomes:

$$1 - c_1(\frac{s_i}{l_i + s_i})[\frac{1}{l_i + s_i} - \frac{s_i}{(l_i + s_i)^2}] + \Delta_{s_i} D_N(S) + \Delta_{s_i} C_N(S) \qquad (27)$$

Necessary condition (2) for a Nash equilibrium is the government optimization of a first price menu auction.

$$MAX_{s_i} \qquad D_N(S) + C_N(S) \qquad s_i \in S \qquad (28)$$

The first order condition for this problem becomes:

$$\Delta_{s_i} D_N(S) + \Delta_{s_i} C_N(S) = 0 \qquad (29)$$

Substitute the government first order condition derived from condition (2) into the first order condition derived form condition (3). This provides the following result:

$$\Rightarrow 1 - c_1(\frac{s_i}{l_i + s_i})[\frac{1}{l_i + s_i} - \frac{s_i}{(l_i + s_i)^2}] \qquad (30)$$

Conditions (1) follows trivially. Condition (4) will be applied later to generate other results. These two necessary conditions then implie that a possible Nash equilibrium is the individual first order condition for a maximum. Below, is a restatemtent of the individuals maximization condition and the first order condition after maximization.

B. The Individual Maximization Problem

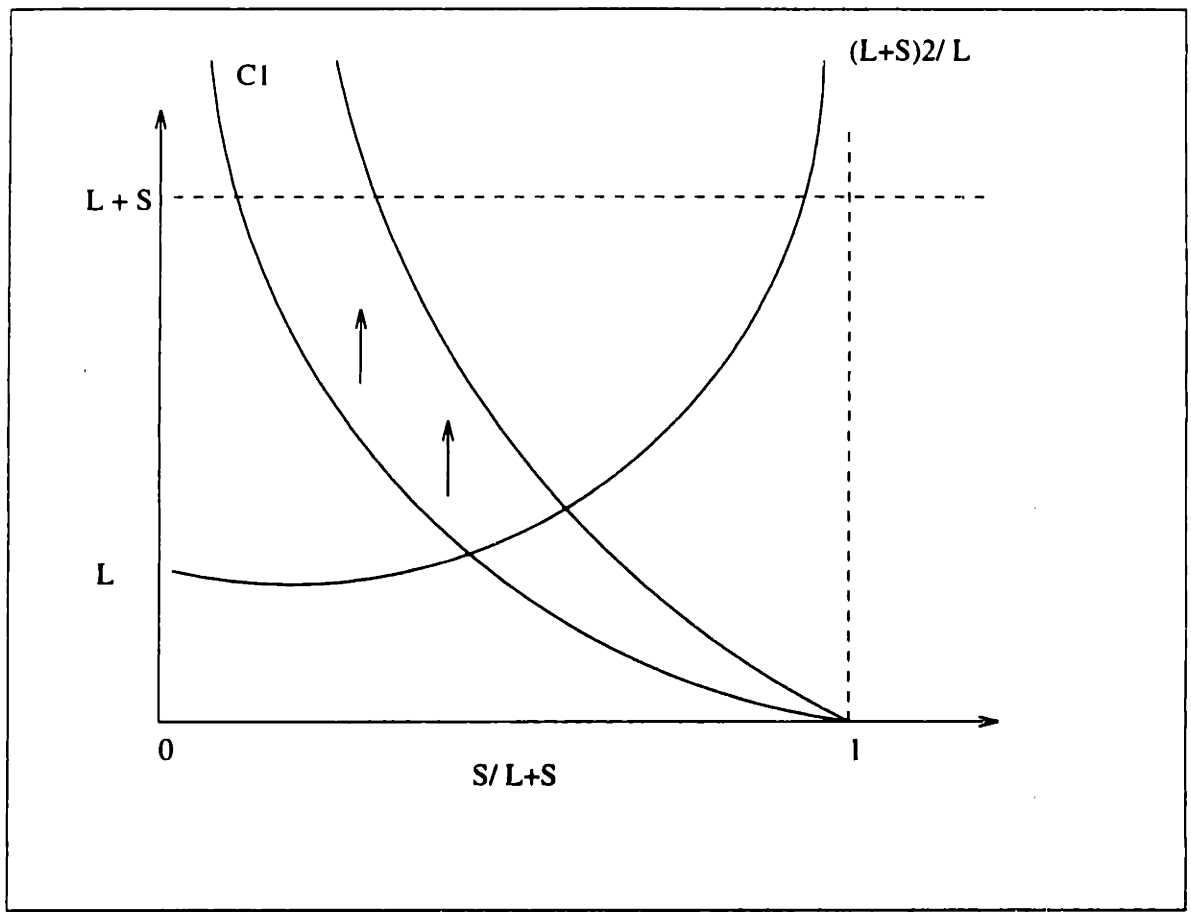
$$MAX_{s_i} \qquad l_i + s_i + t_i - c_i(\frac{s_i}{l_i + s_i}) \tag{31}$$

The first order condition after some algebra, leaves the following statement:

$$\frac{(l_i + s_i)^2}{l_i} = c_1(\frac{s_i}{l_i + s_i}) \tag{32}$$

The first order condition can then be graphed. See the next page for the graph.

Graph of the Individual First Order Maximization Condition



Feasible points correspond to those within the box created by the dashed lines. Note that a shift in the marginal contributions schedule will raise the proportion of transfers in income. Contributions are most effective when the proportion of transfers in income is low.

C. The One Lobby Case in the Partially Organized Polity

As stated in the discussion of individual maximization, a shift in the marginal contributions schedule raises both the overall level of contributions and the level of transfer income as a proportion of individual total income. The individual, along with other individuals with a common economic interest, and aware of this condition, may form a lobby to raise the marginal contributions schedule and extract a larger payment from the government. This hypothesis is explored below. First, for the case of a transfer payment made to only part of the polity. Second, for the case of a transfer payment made to two non-overlapping sets of the polity, where there is no individual in the polity who does not receive a payment.

With only one lobby, the auction then becomes:

$$MAX_{S_1} \qquad IC(S_1)+aIW(S_1)+a(N-I)W(S_1)+b\frac{V(IS_1)}{N} \quad s.t. \quad S_1 = T_1 \tag{33}$$

Expand the function to get:

$$Ic(\frac{S_i}{l_i+s_i}) + aI(l_i+s_i-t_i-c(\frac{s_i}{l_i+s_i})) + a(N-I)(l_j-s_i) + b(\frac{v(Is_i)}{N}) \tag{34}$$

After some algebra, the following first order condition is obtained:

$$c_{1i} = ([\frac{a}{1-a}][\frac{N-I}{I}] - [\frac{b}{1-a}][\frac{v_1}{N}])\frac{(l_i + s_i)^2}{l_i} \qquad (35)$$

If the government raises the value of a, the welfare coefficient, the marginal contributions schedule shifts up. However, if, the government raises the value of voter support, the contributions schedule shifts down. The intuition for the latter result is that the government would prefer adding individuals to the transfer rolls, if there are individuals without them, than providing a greater transfer to those who already have them. Another interesting result concerns the size of the lobby vis-a-vis the unorganized group. If the unorganized group gets larger and the organized group gets smaller, the marginal contribution schedule shifts up. For an unorganized polity, the optimal size of lobby is a small one, as the government can increase transfers to this group and minimize the loss in taxes to the unorganized group. This is a paralell result to Becker (1983). For the partially organized polity, then, the means to a maximum transfer is a small lobby, a non-welfare minded government, and a government not concerned about the voter support for the next election.

D. The Two Lobby Case in the Fully Organised Polity

With two non-overlapping lobbies, the result is quite different. The auction, where voter support functions msy or may not be identical across groups, becomes:

$$MAX_{s_i,s_j} \quad Ic_i(s_i) + (N-I)c_j(s_j) + a[Iw_i + (N-I)w_j] + b[\frac{V_1(Is_i) + V_2((N-I)s_j)}{N}] \quad (36)$$

$$s.t. s_i + s_j = T \quad (37)$$

$$(38)$$

After substitution and some algebra, the following first order condition is obtained:

$$c_{2j} - c_{1i} = \frac{1}{(1-a)}\frac{N}{I} - \frac{b}{1-a}(V_2 - V_1) \quad (39)$$

When voter support functions are indentical across groups then becomes:

$$c_{2j} - c_{1i} = \frac{1}{1-a}\frac{N}{I} \quad (40)$$

Note the voter support function does not exist in the fully organized lobby game. Also, note the zero sum quality of the game; a rise in one lobby marginal contributions schedule means a decline for the other. All things equal, then, the larger the lobby, the greater the marginal contributions schedule. The major

implication under a fully organized polity is this: increasing the size of the lobby is essential to greater transfers. The welfare term operates to reinforce the lobby size variable, and operates in the same direction as in the partially organized polity, with greater welfare concerns raising the value of marginal contributions, for the larger lobby.

Now apply condition (4) for a Nash equilibrium to equation (39). This implies that there is a 'campaign reform' Nash condition. The first order condtion then becomes

$$V_2 - V_1 = \frac{1}{b}\frac{N}{I} \tag{41}$$

The voter support conditions operate in the same zero sum manner as the campaign contributions schedules did. This implies that contribution limits will not impede the formation of lobbies and will not end the redistribution of income to groups who can deliver votes at elections.

Contrasting the optimal strategies for the partially organized case and the fully organized case is important for deciding which set of assumptions best fit the data presented in the first section. Voter support lowers the value of contributions to the individual under the partial organization assumption, it matters for the fully organized polity when groups deliver different votes. Social welfare minded-ness increases the value of marginal contributions in both cases. Small lobbies work best to increase the value of marginal contributions when the polity is partially organized, large lobbies work best to increase the

value of marginal contributions when the polity is fully organized. Under campaign reform, the voter support conditions replace the contributions schedule in determining allocations. And finally, the fully organized polity is a zero sum game.

Consider the democratic government and its polity passing through two stages, an early stage where lobbies are poorly organized and the democratic government votes to expand the transfers, and a later stage, when transfers have been granted to all members of the polity, and lobbies seek to maximize their size, for the benefit of the individuals within them. This dynamic political and economic process could explain the facts presented in Section two. It is to these facts, and others like them, that the paper will now return.

5 Conclusion

The twenty country facts for 1972 to 1992 follow in an appendix of this chapter. What is obvious from a cursory review of these facts is that the level of transfers is consistent and stable over time, with the large groups of individuals typically expanding their share of the on-budget expenditures on transfers at the expense of, perhaps state and local government, and, certainly, at the expense of industry and foreign aid. Since these last two groups are assumed to be able to provide contributions more readily than the other groups, it would follow that contributions determinants are not a plausible explanation for transfer allocations under

a democratic state of nature. It is more likely that elections determine transfers, with large, well-organized groups who vote consistently crowding out smaller, less-organized groups, regardless of the amount of contributions made by any group within, or outside the polity.

The effects of contributions offered by an industry, and the typically legally contrained contributions of foreign aid recipients, are dominated in the transfer struggle by the small quantity, or absent quantity, of votes that either group can deliver. This result must be qualified for on-budget outlays only. What effect campaign contributions have for off-budget outlays is best left for other literature, such as the political economy of trade literature, to assess. As an untested hypothesis, democracy seems to solve the problem of appointment to the state of natureat the cost of election buying, and the crowding out of the smaller, less organized groups in preference for the larger, well-organized groups of individuals in the struggle for non-market on-budget transfers. Extensions to this project would econometrically assess the emprical relationship of votes to transfers, and attempt to understand further the empirical and theoretical determinants of contributions themselves. I leave this for other authors to explore in the search for a deeper understanding of the properties of a democratic state of nature.

This concludes an international survey, revisiting, in 1995, the Schumpeter paradigm of Capitalism, Socialism, and Democracy.

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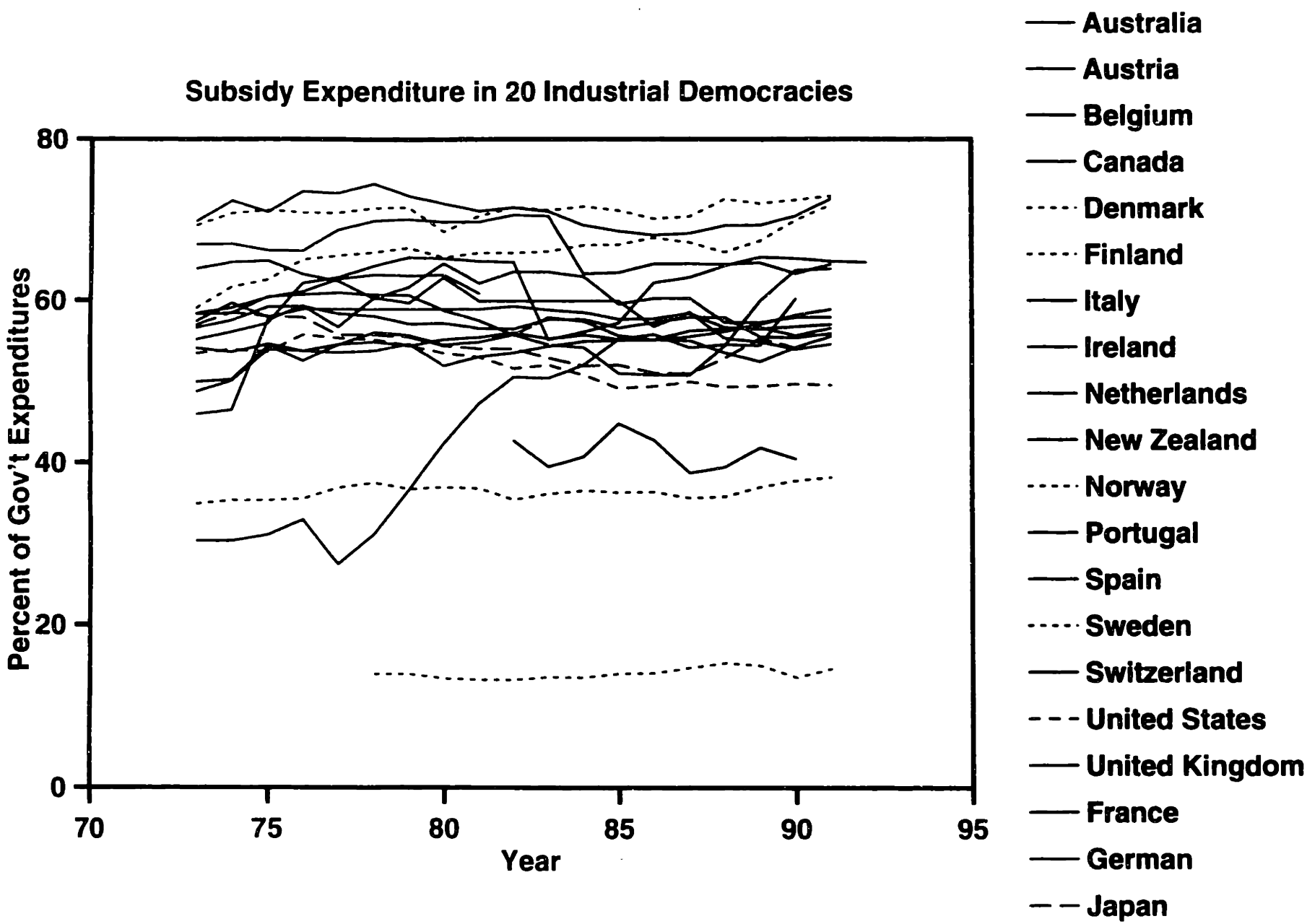
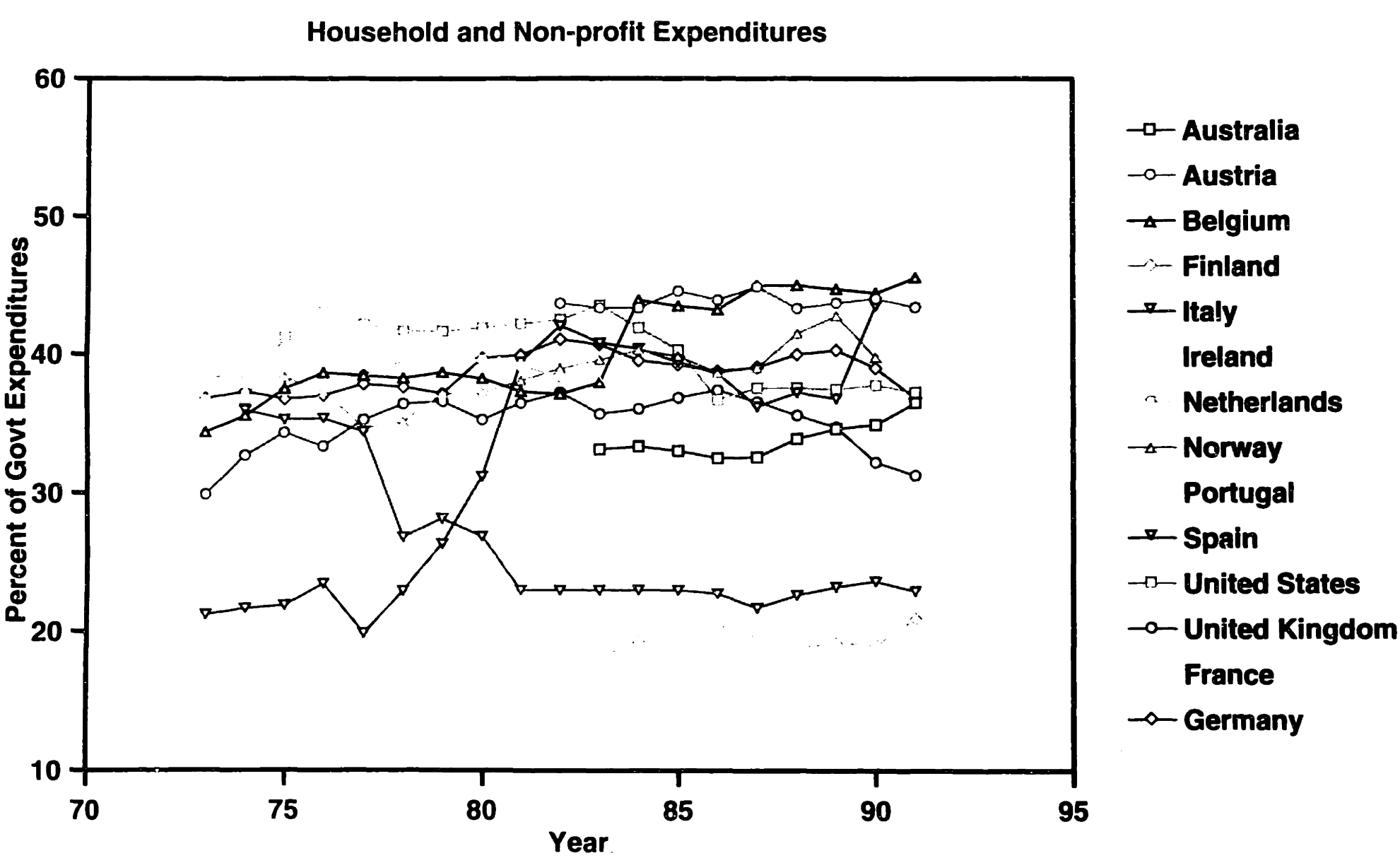
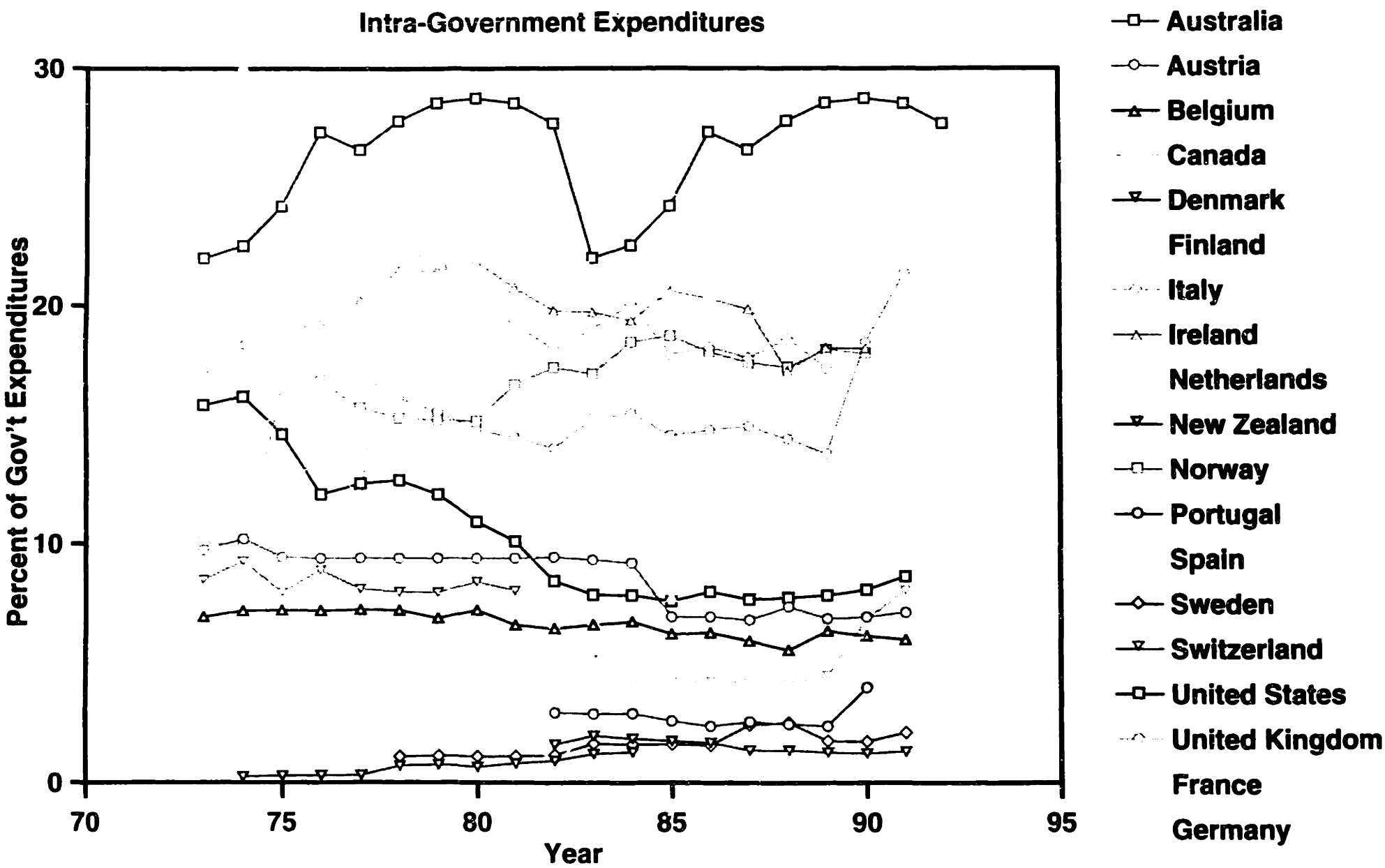

Subsidy Expenditure in 20 Industrial Democracies
Percent of Gov't Expenditures
80
60
40
20
0
70
75
80
85
90
95
Year
Australia
Austria
Belgium
Canada
Denmark
Finland
Italy
Ireland
Netherlands
New Zealand
Norway
Portugal
Spain
Sweden
Switzerland
United States
United Kingdom
France
German
Japan


Household and Non-profit Expenditures
Percent of Govt Expenditures
60
50
40
30
20
10
70
75
80
85
90
95
Year
Australia
Austria
Belgium
Finland
Italy
Ireland
Netherlands
Norway
Portugal
Spain
United States
United Kingdom
France
Germany


Intra-Government Expenditures
Percent of Gov't Expenditures
30
20
10
0
70
75
80
85
90
95
Year
Australia
Austria
Belgium
Canada
Denmark
Finland
Italy
Ireland
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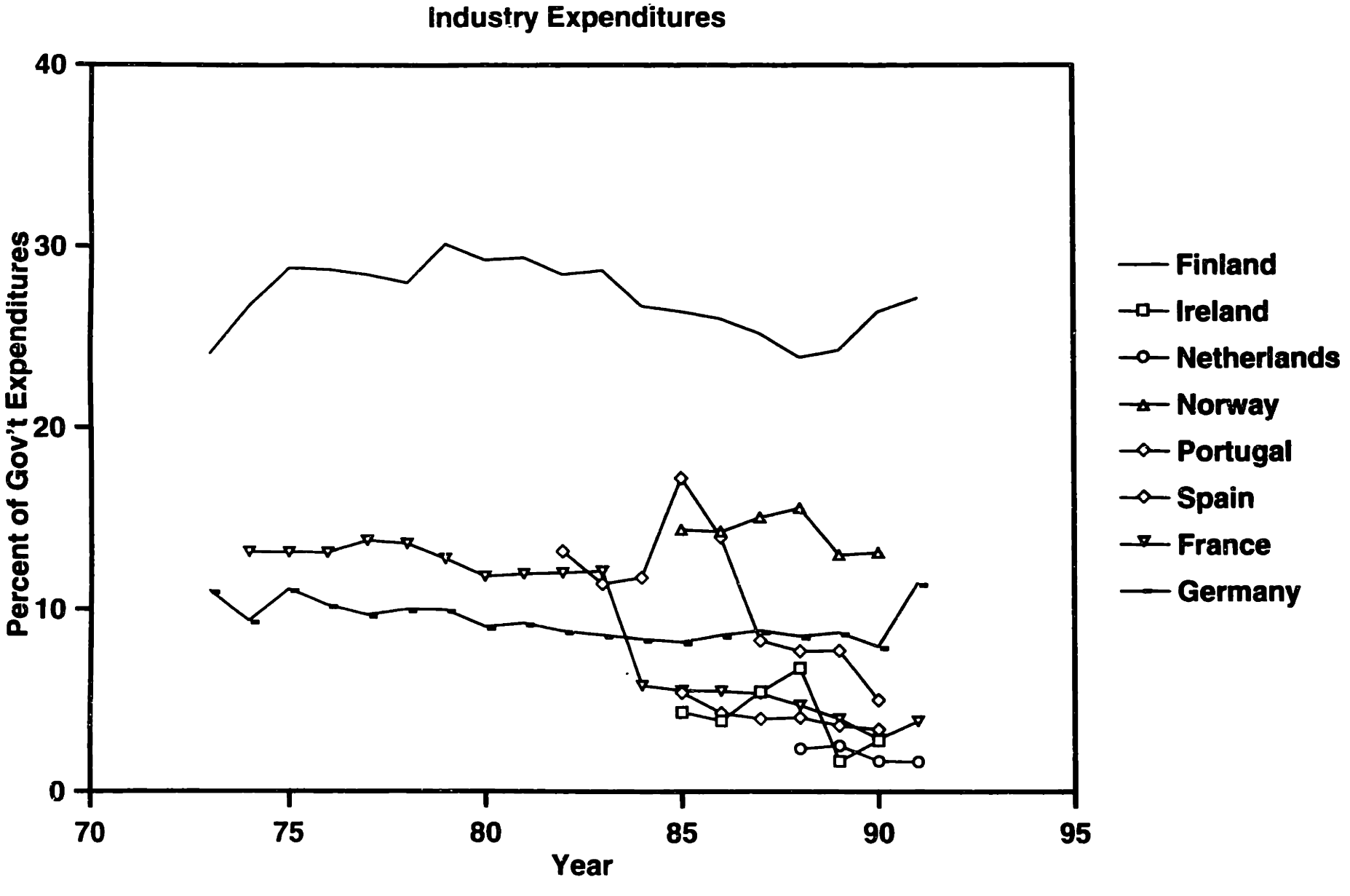
New Zealand
Norway
Portugal
Spain
Sweden
Switzerland
United States
United Kingdom
France
Germany


Industry Expenditures
Percent of Gov't Expenditures
40
30
20
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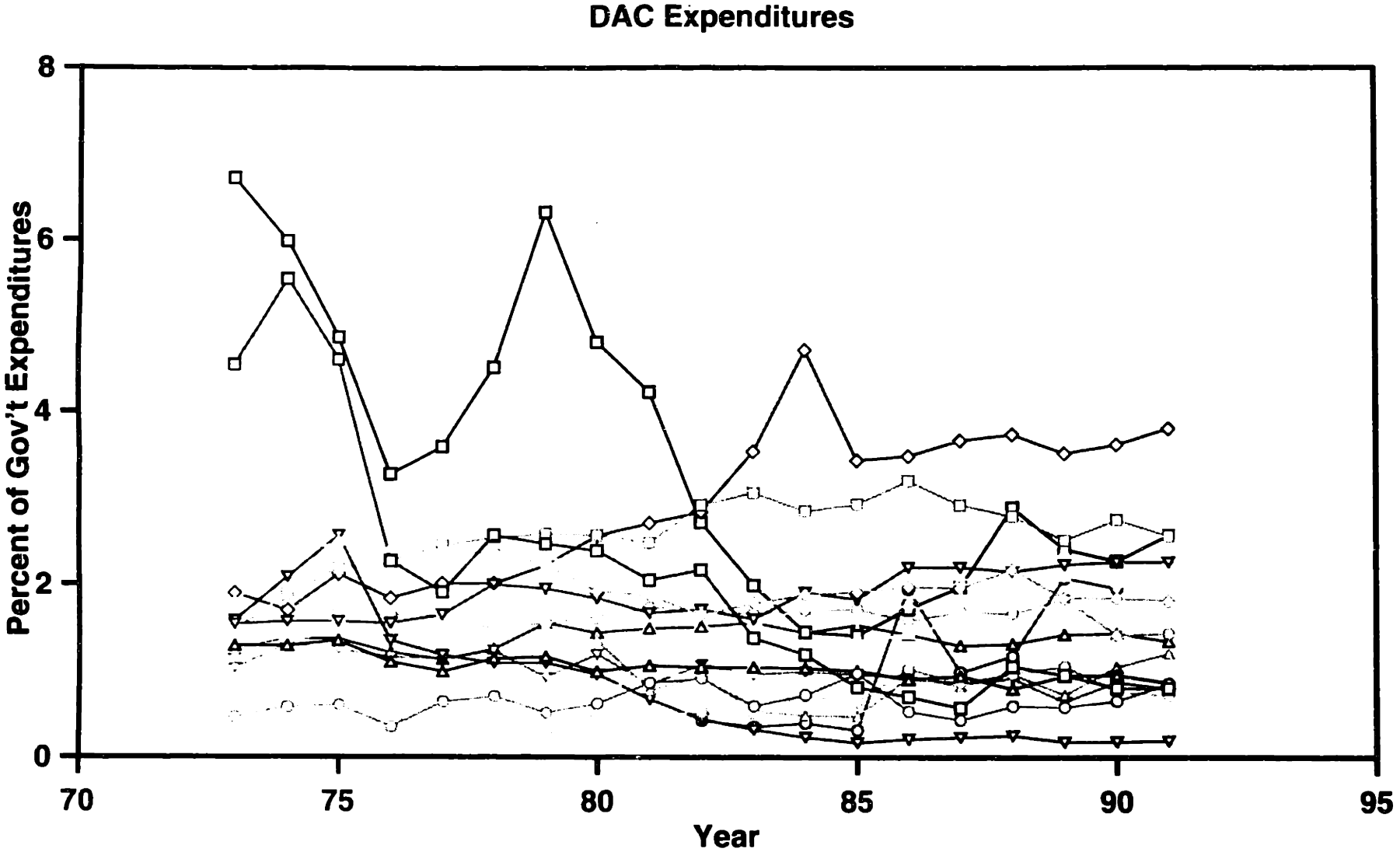
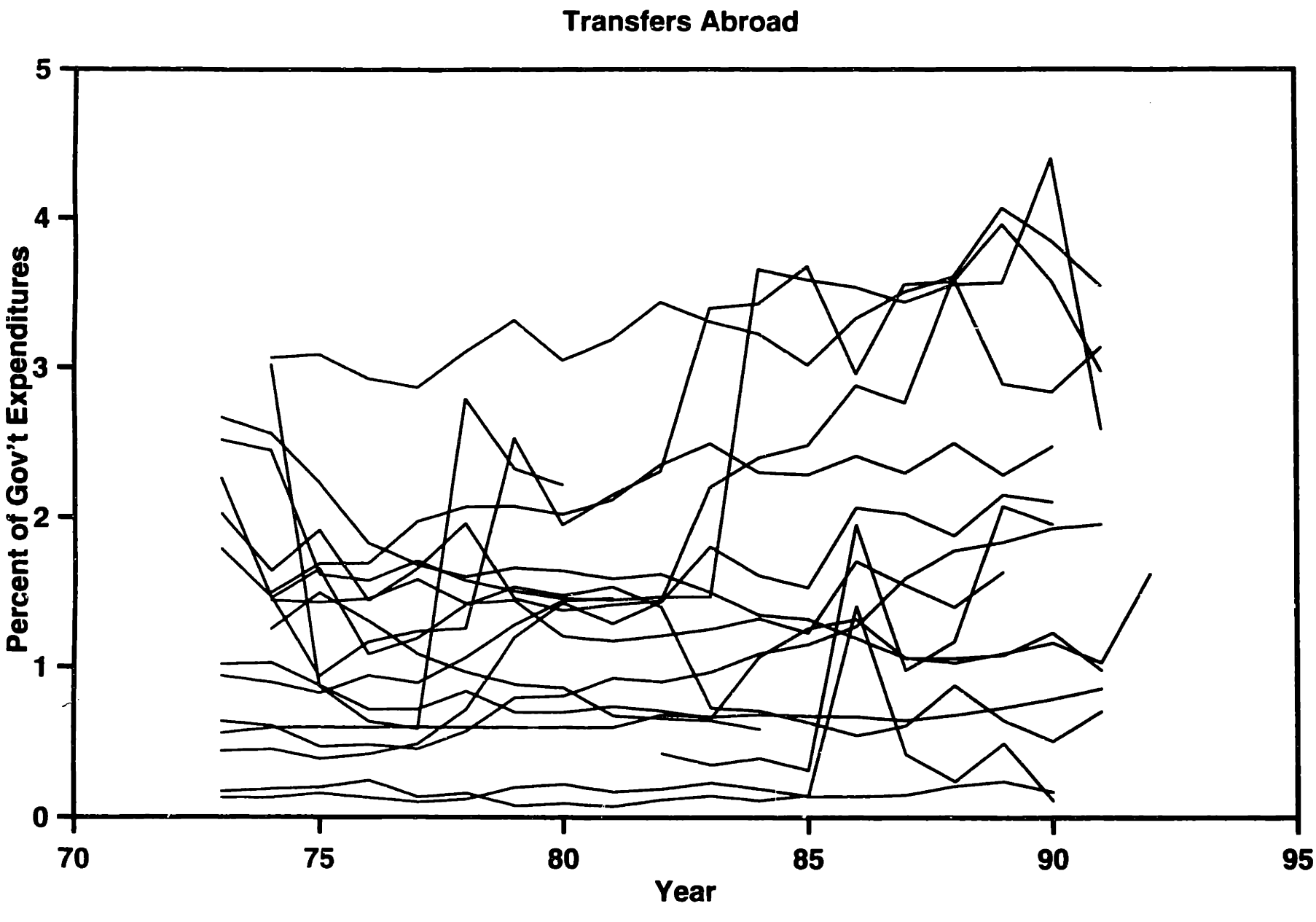
Year
Finland
Ireland
Netherlands
Norway
Portugal
Spain
France
Germany


DAC Expenditures
Percent of Gov't Expenditures
0
2
4
6
8
70
75
80
85
90
95
Year


Transfers Abroad
Percent of Gov't Expenditures
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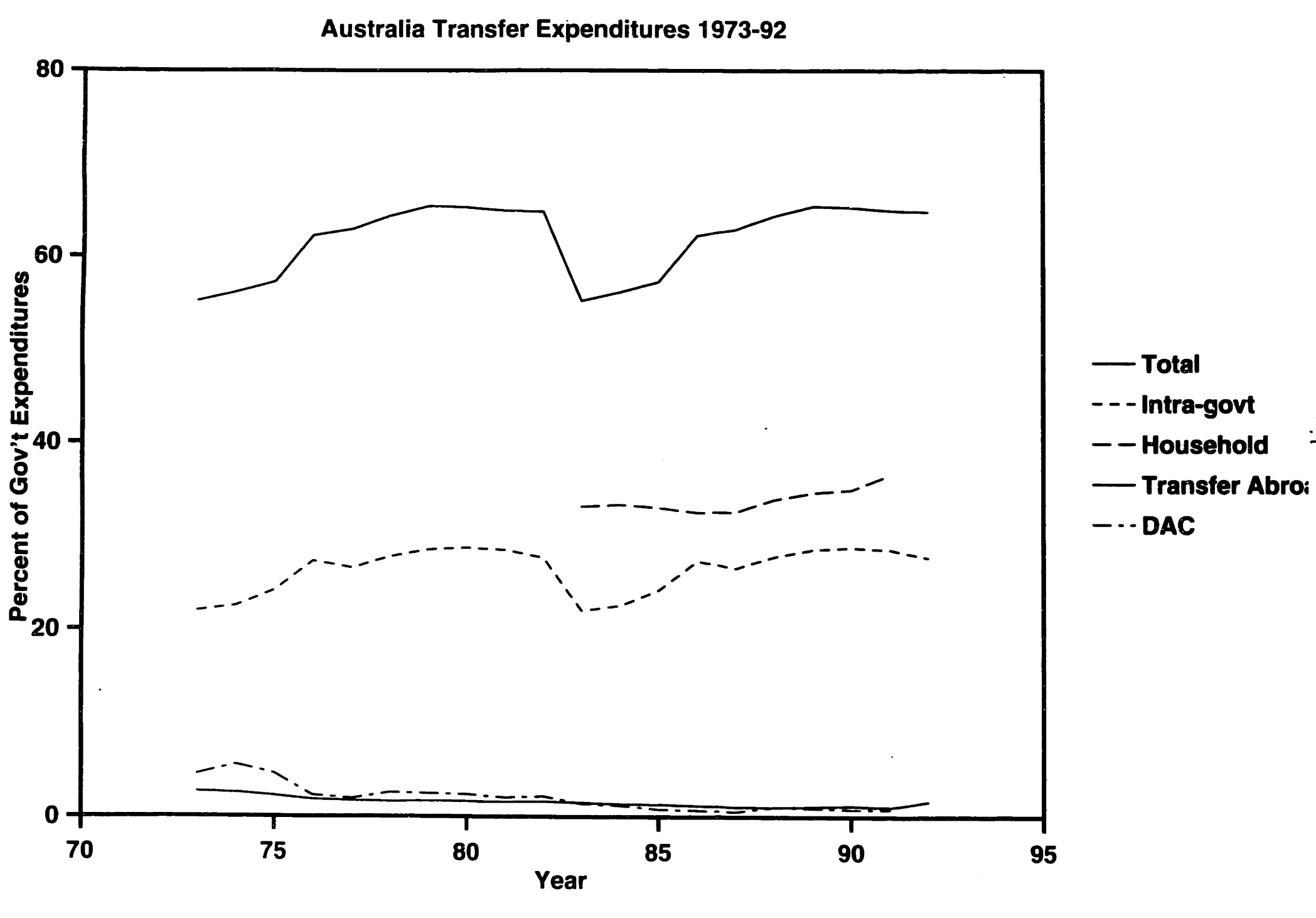
1
2
3
4
5
70
75
80
85
90
95
Year


Australia Transfer Expenditures 1973-92
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20
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Percent of Gov't Expenditures
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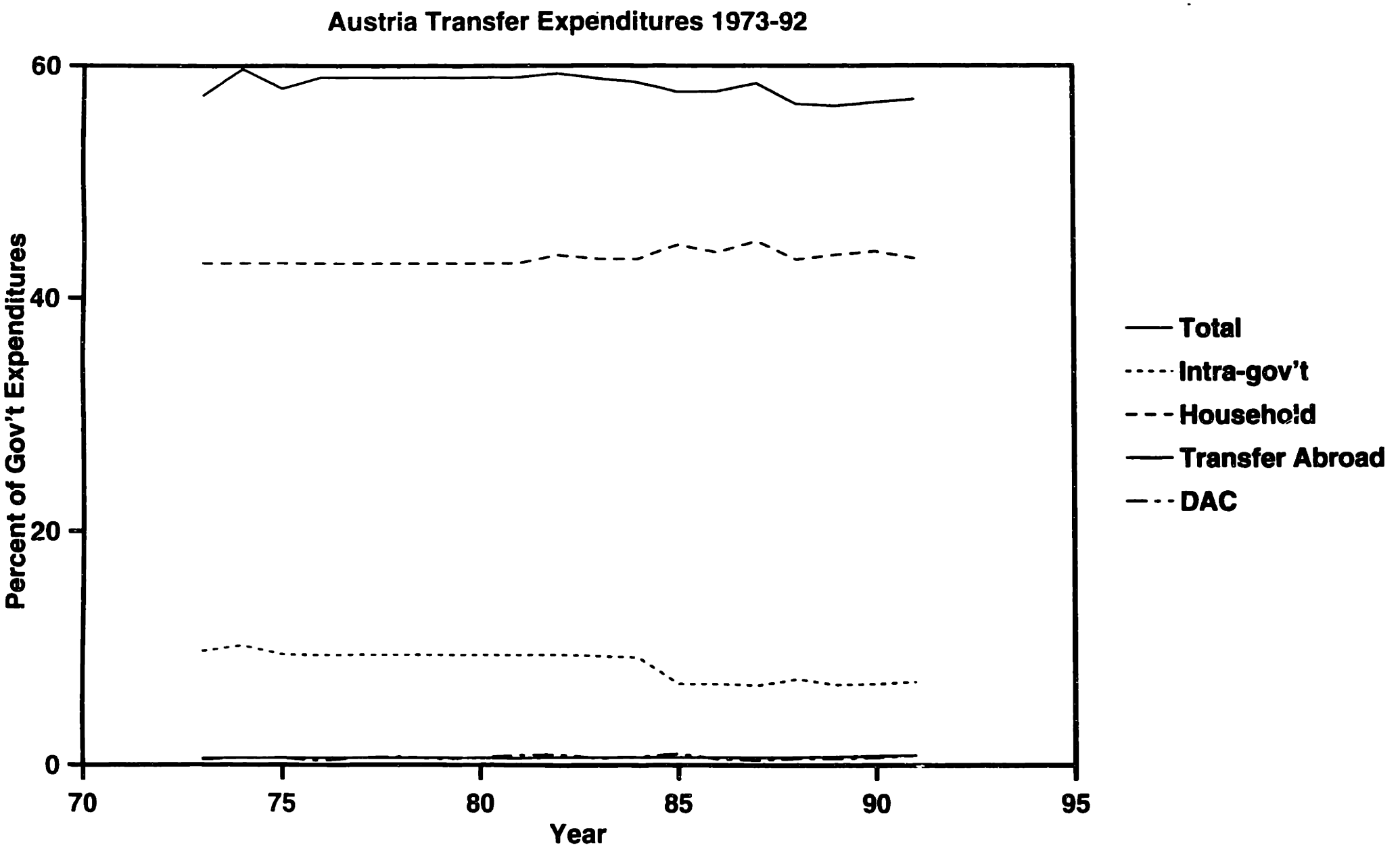
95
Year
Total
Intra-govt
Household
Transfer Abroa
DAC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60
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Percent of Gov't Expenditures
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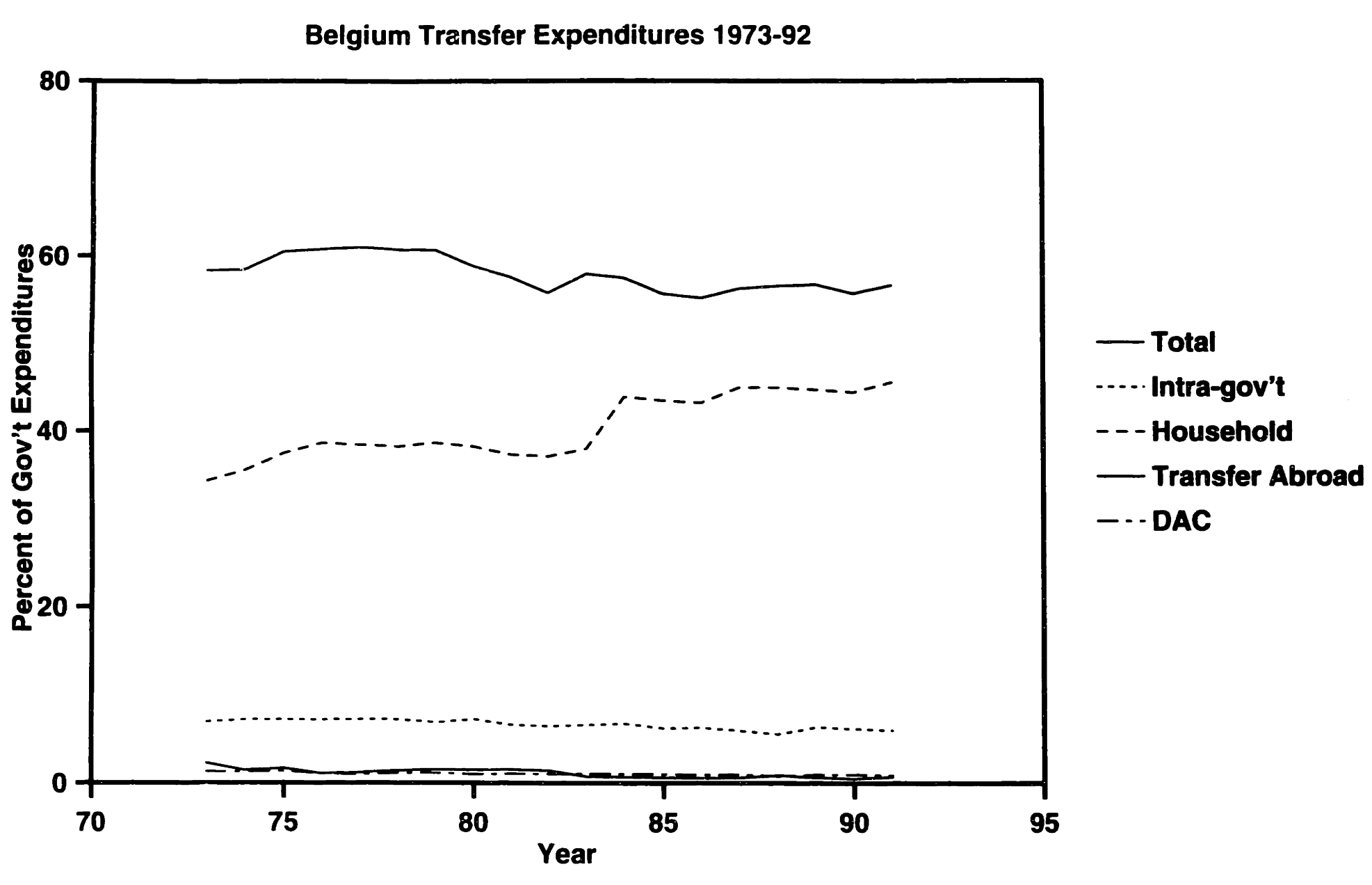
Year
Total
Intra-gov't
Household
Transfer Abroad
DAC


Belgium Transfer Expenditures 1973-92
Percent of Gov't Expenditures
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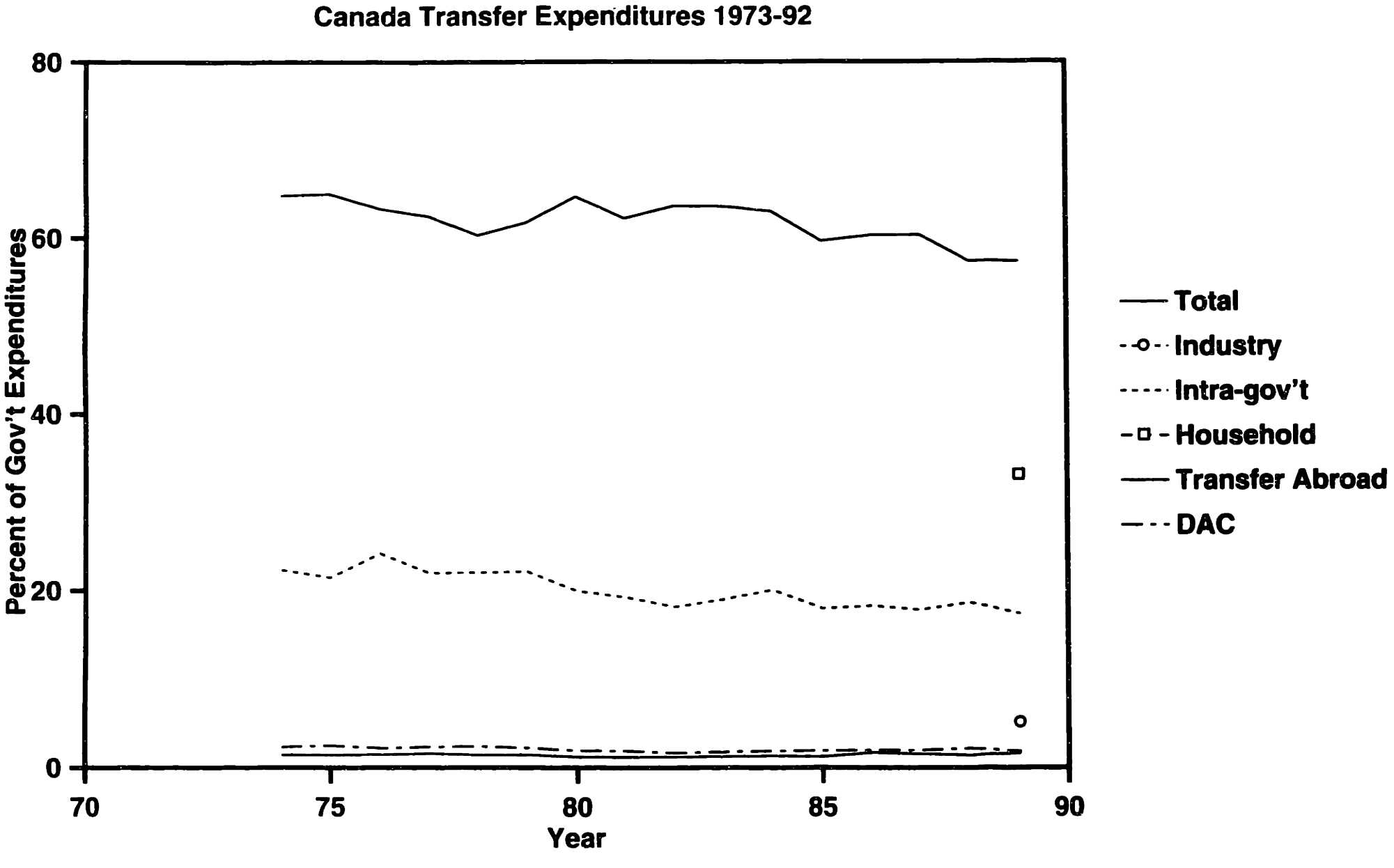
Year
Total
Intra-gov't
Household
Transfer Abroad
DAC


Canada Transfer Expenditures 1973-92
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Percent of Gov't Expenditures
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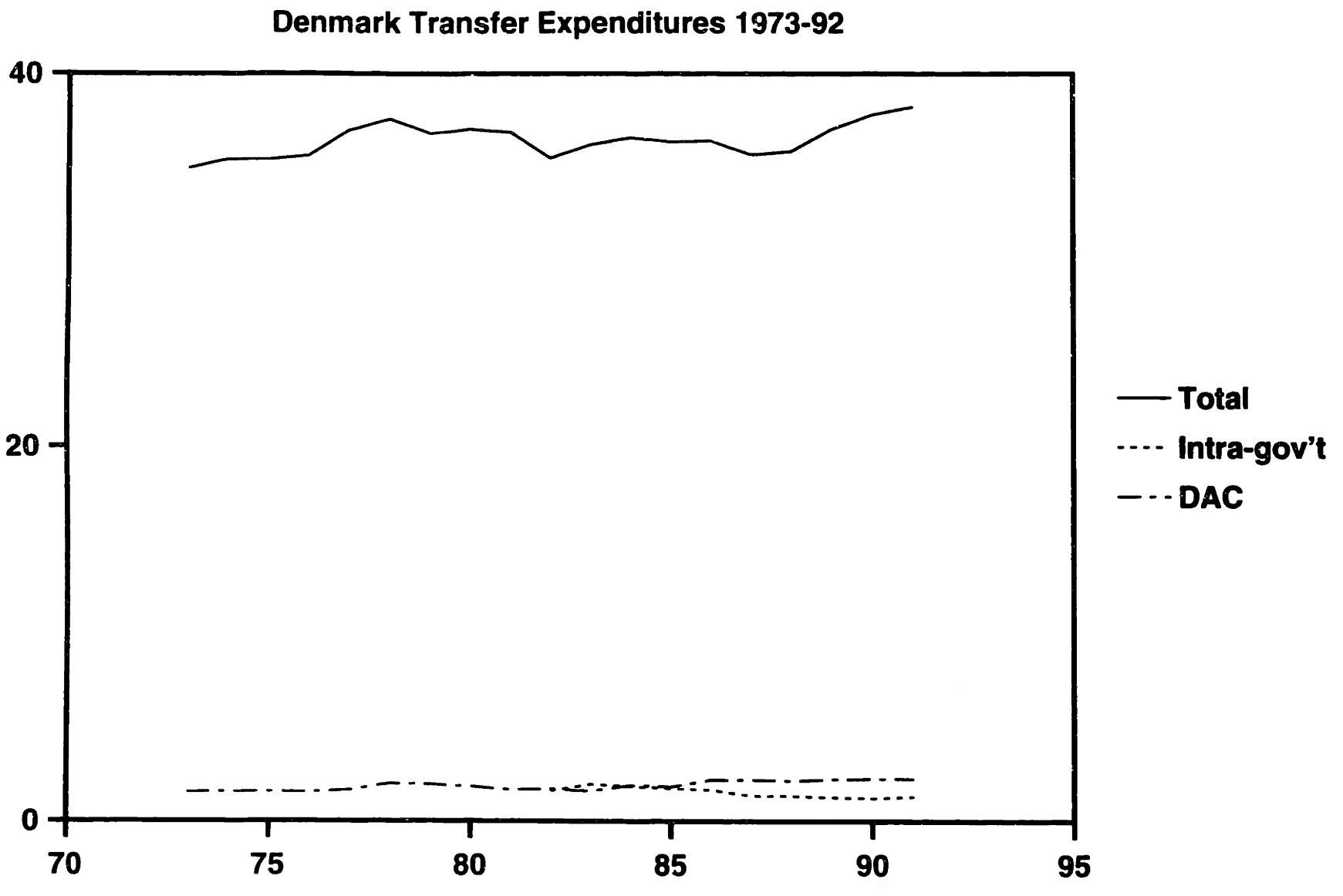
Year
Total
Industry
Intra-gov't
Household
Transfer Abroad
DAC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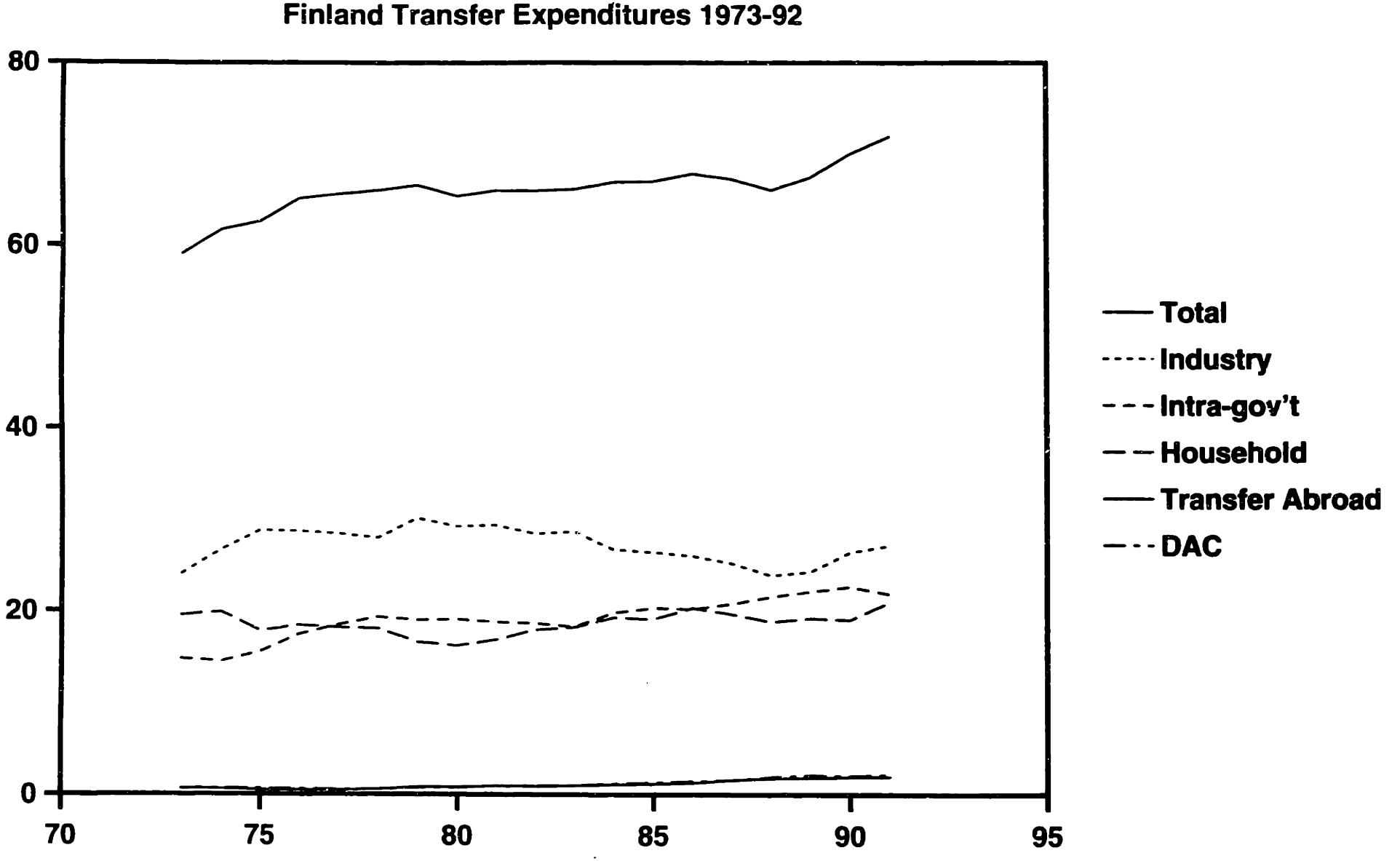
Total
Intra-gov't
DAC


Finland Transfer Expenditures 1973-92
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Household
Transfer Abroad
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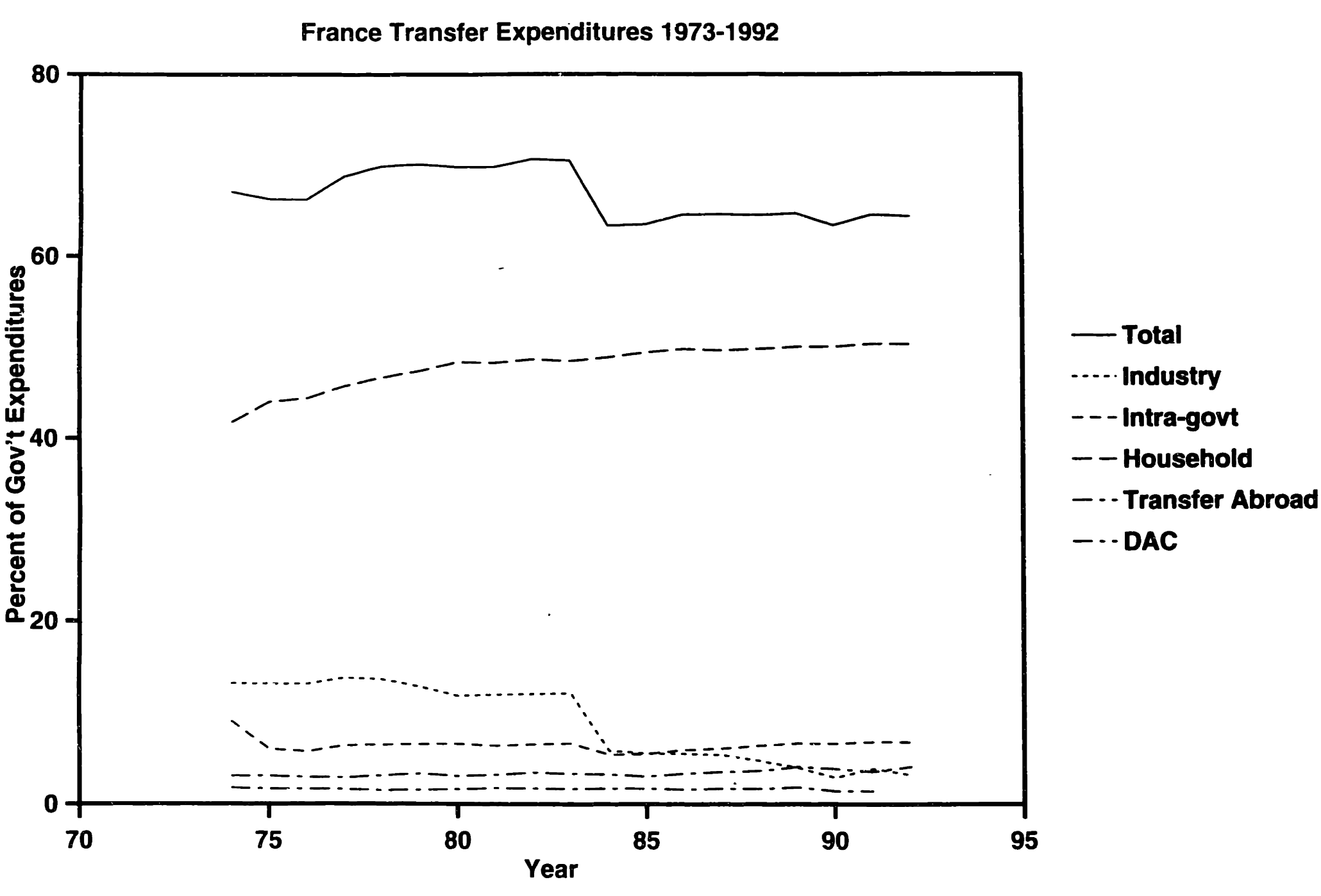
France Transfer Expenditures 1973-1992
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Percent of Gov't Expenditures
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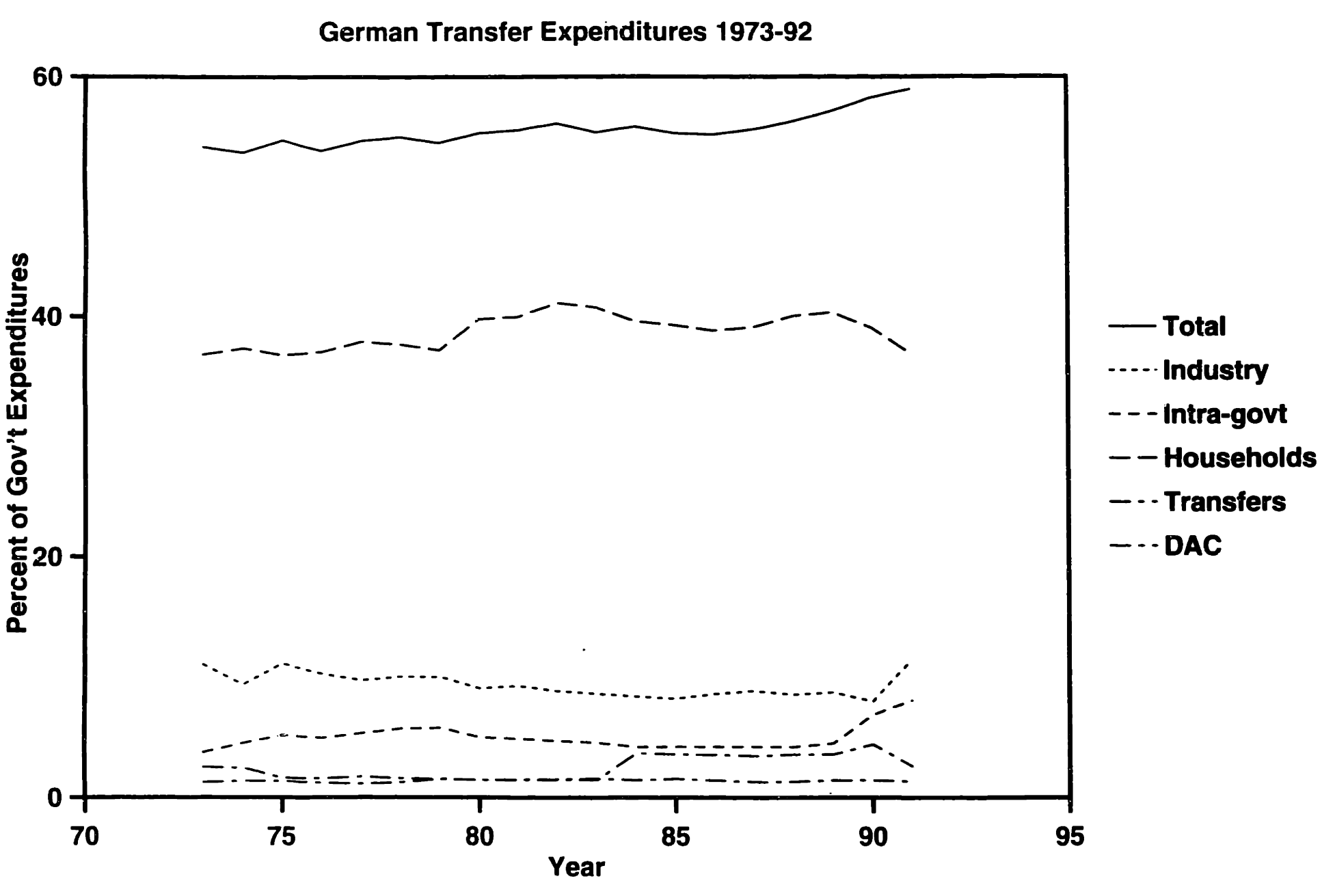
Year
Total
Industry
Intra-govt
Household
Transfer Abroad
DAC


German Transfer Expenditures 1973-92
60
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Percent of Gov't Expenditures
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Year
Total
Industry
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Households
Transfers
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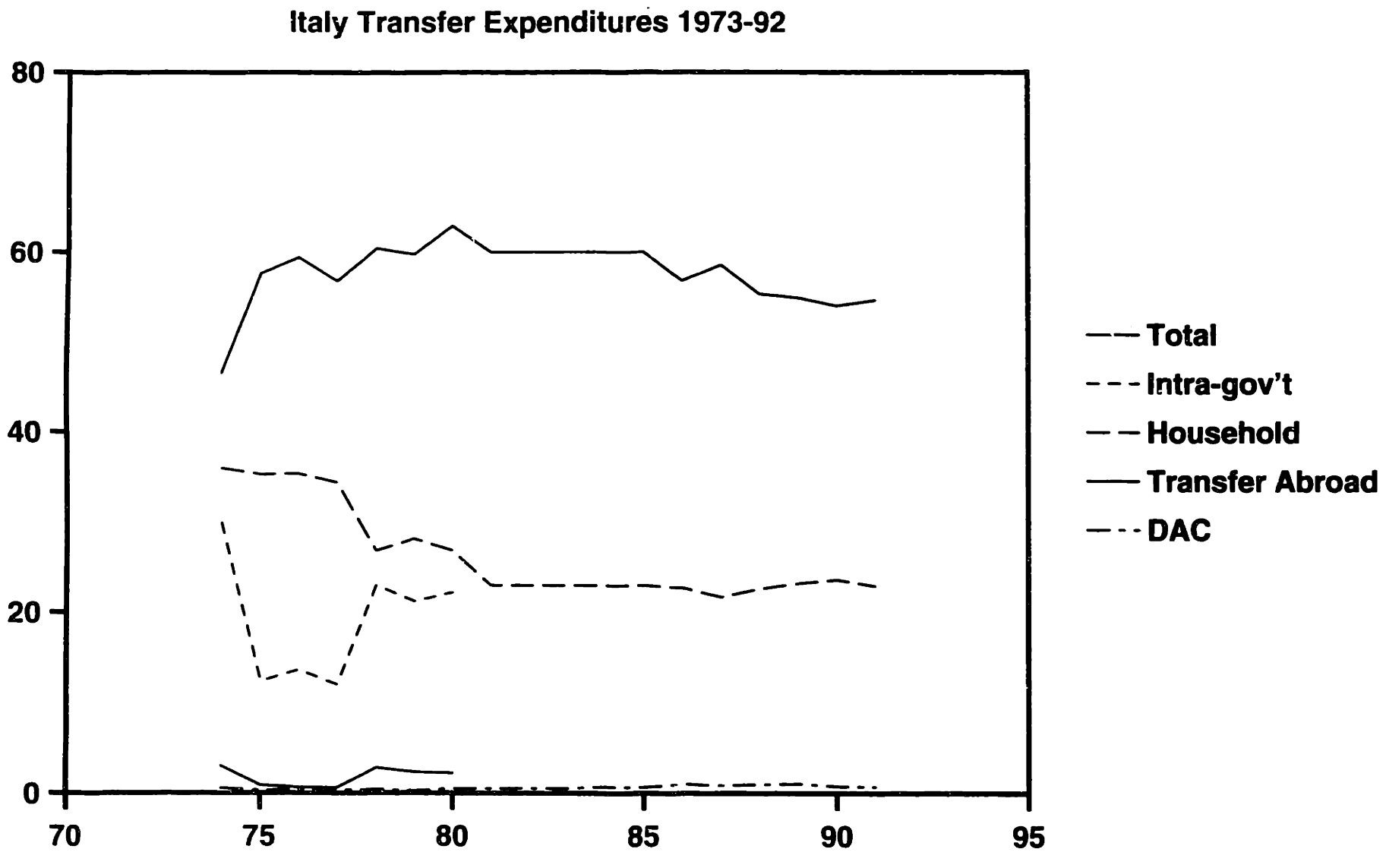
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Household
Transfer Abroad
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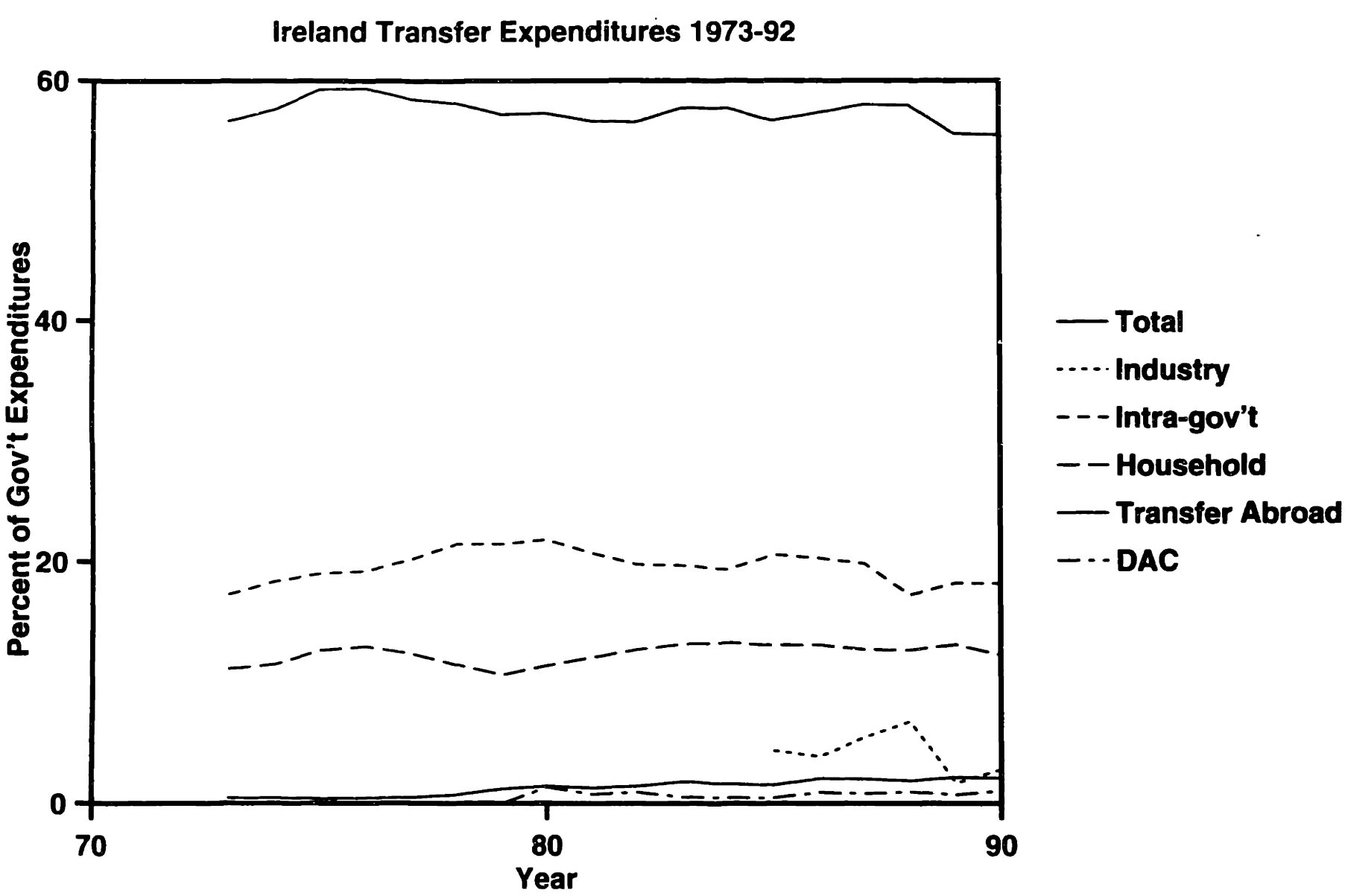
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Percent of Gov't Expenditures
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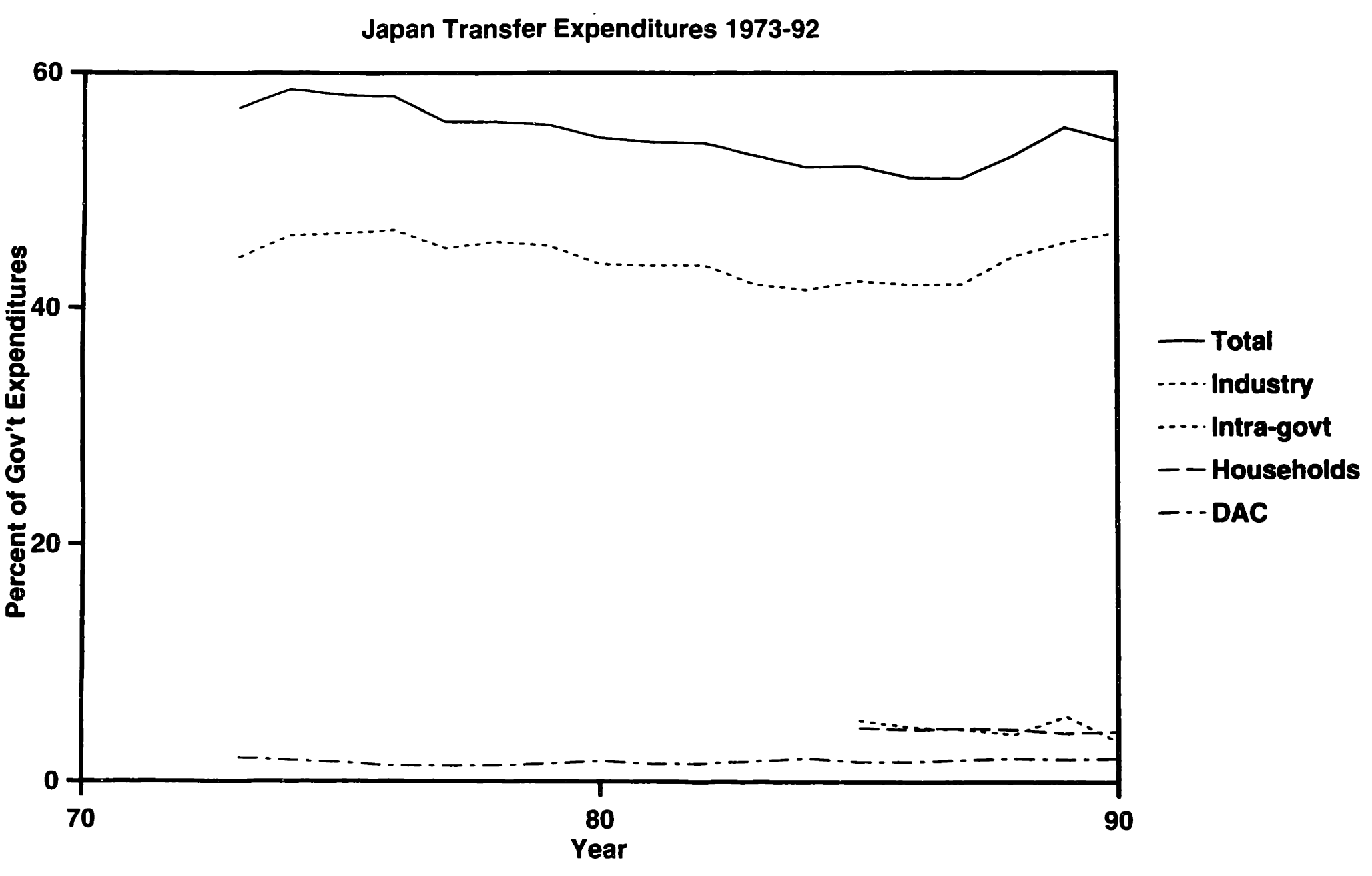
Year
Total
Industry
Intra-gov't
Household
Transfer Abroad
DAC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Percent of Gov't Expenditures
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80
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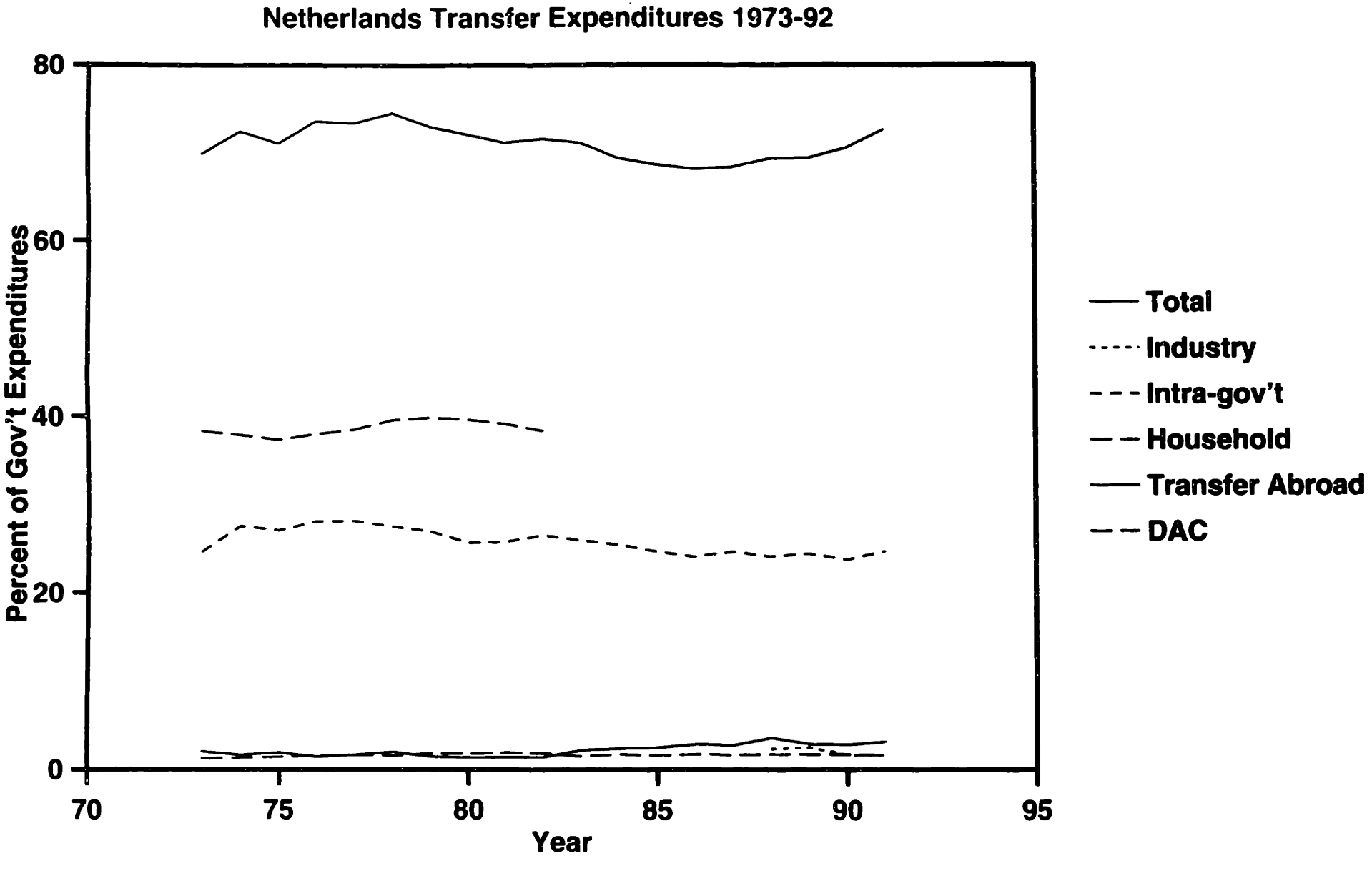
Year
Total
Industry
Intra-govt
Households
DAC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Percent of Gov't Expenditures
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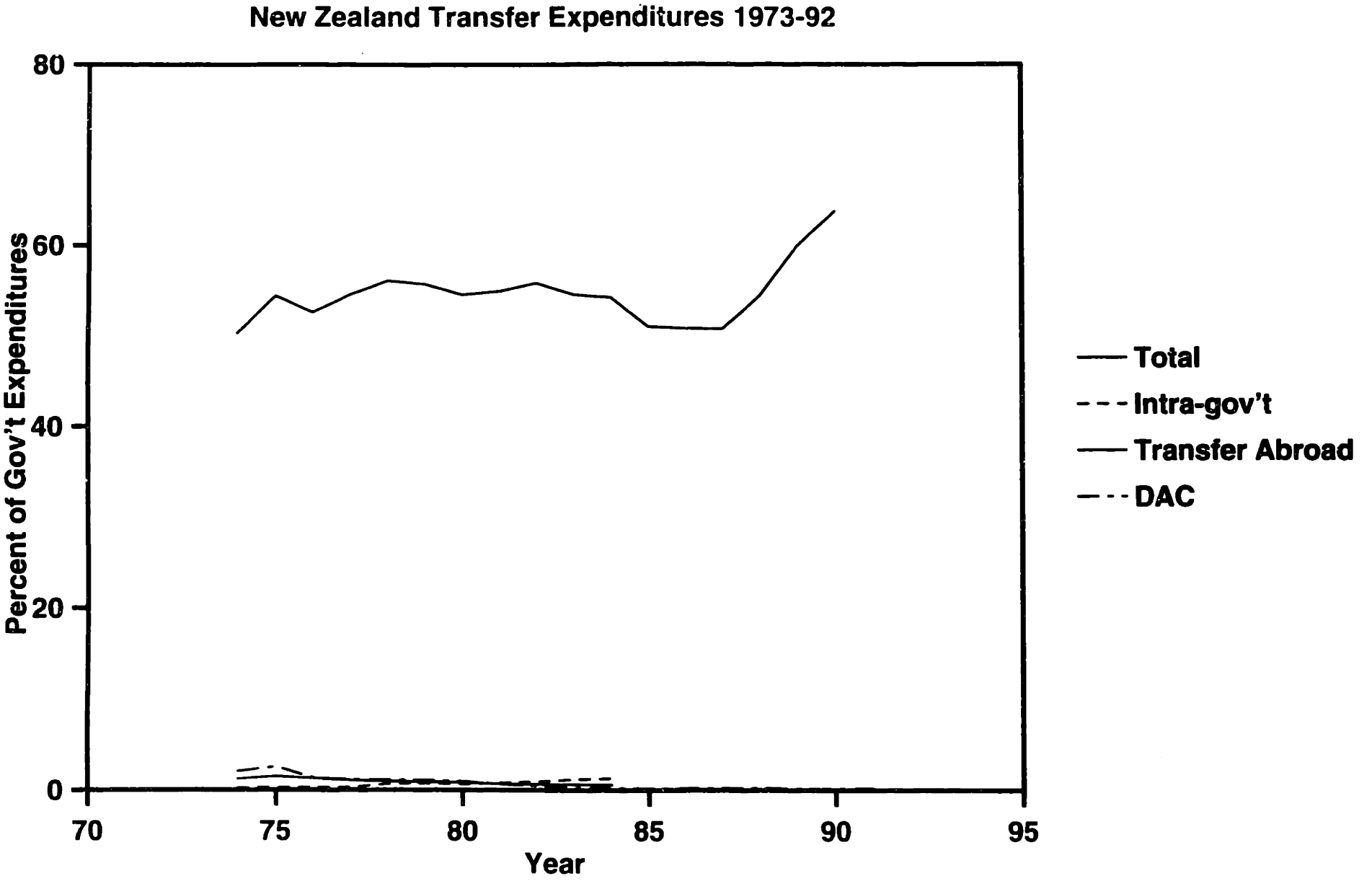
Year
Total
Industry
Intra-gov't
Household
Transfer Abroad
DAC


New Zealand Transfer Expenditures 1973-92
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Percent of Gov't Expenditures
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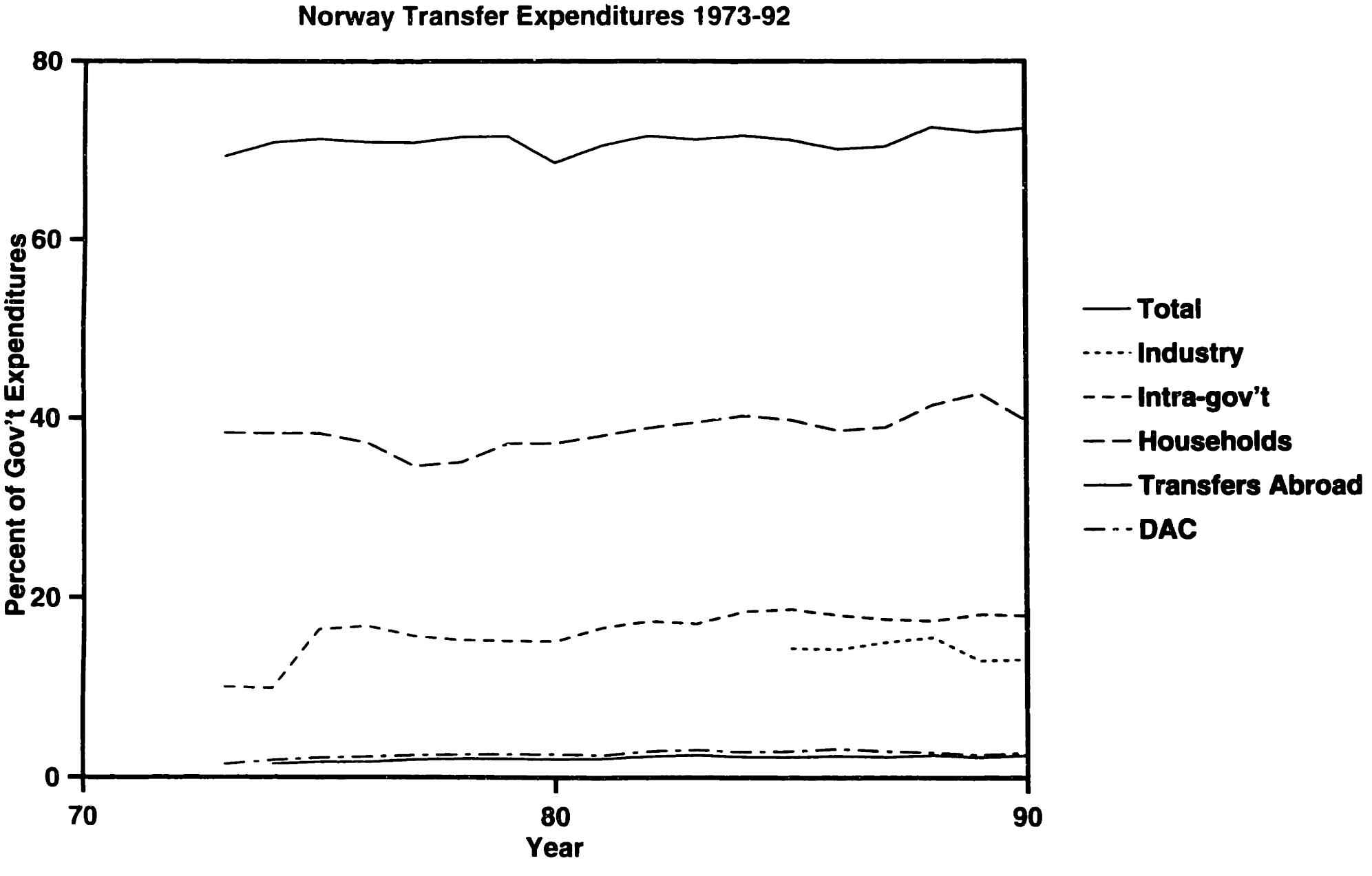
Year
Total
Intra-gov't
Transfer Abroad
DAC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Percent of Gov't Expenditures
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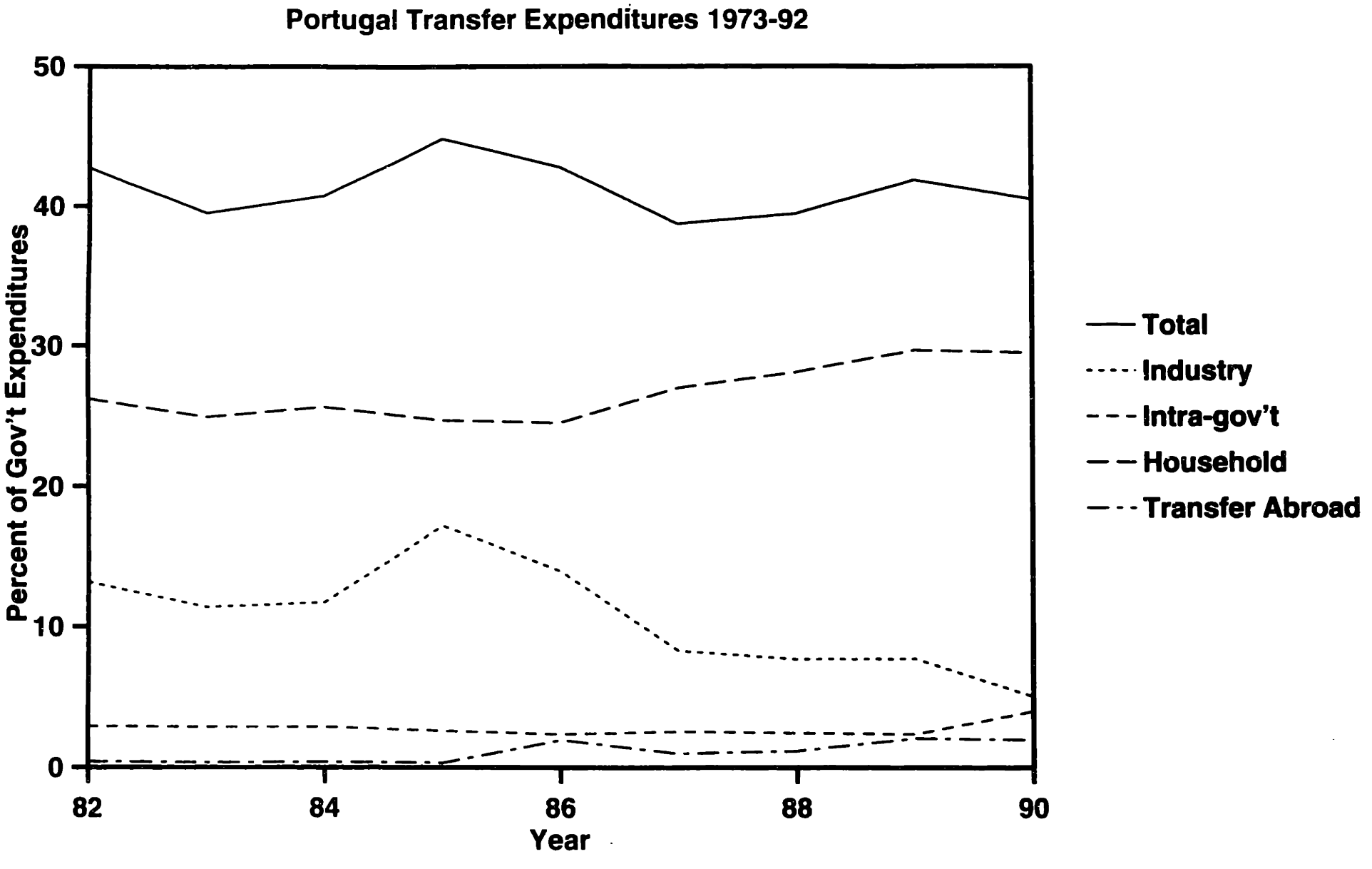
80
90
Year
Total
Industry
Intra-gov't
Households
Transfers Abroad
DAC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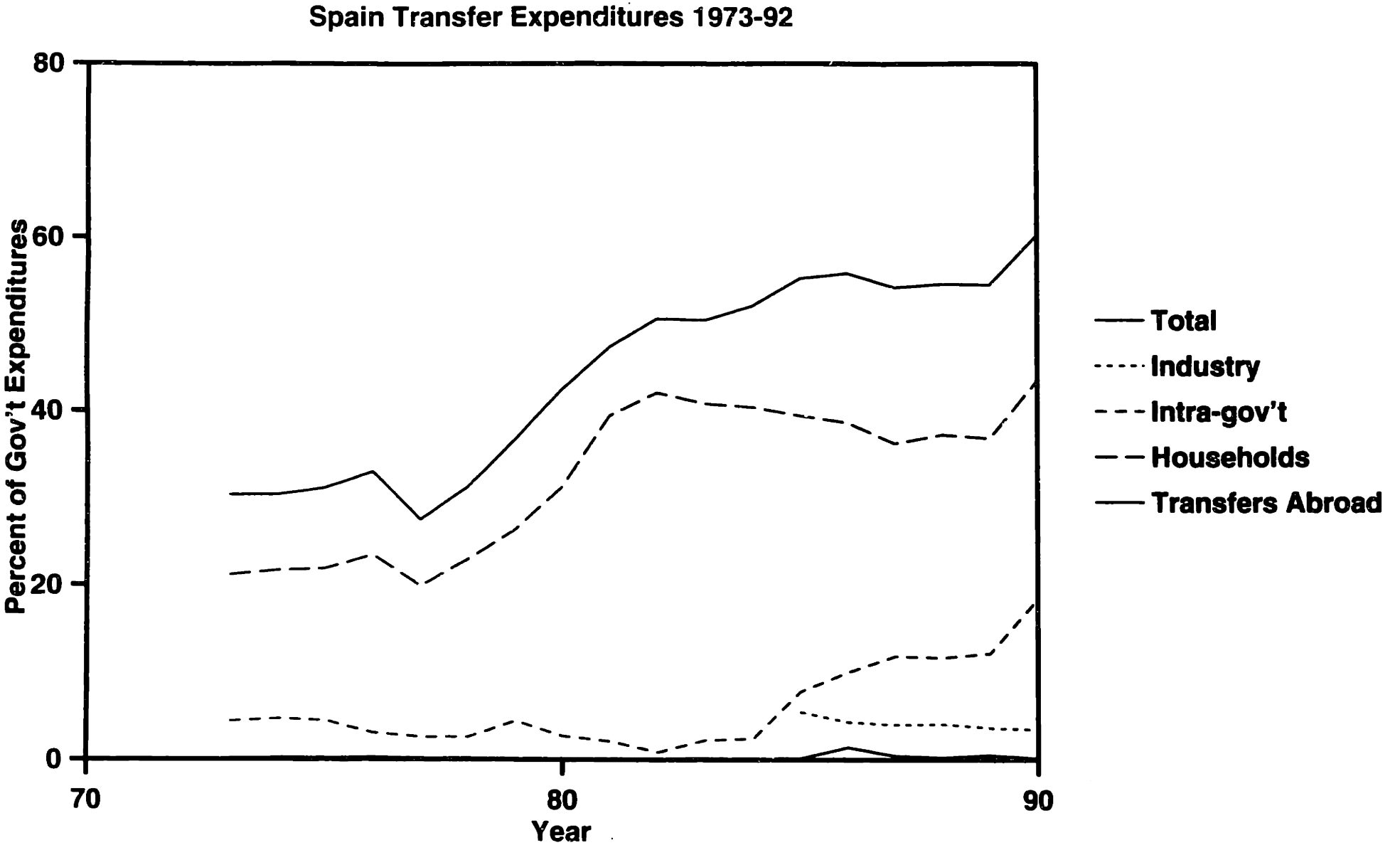
50
40
30
20
10
0
Percent of Gov't Expenditures
82
84
86
88
90
Year
Total
Industry
Intra-gov't
Household
Transfer Abroad


Spain Transfer Expenditures 1973-92
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20
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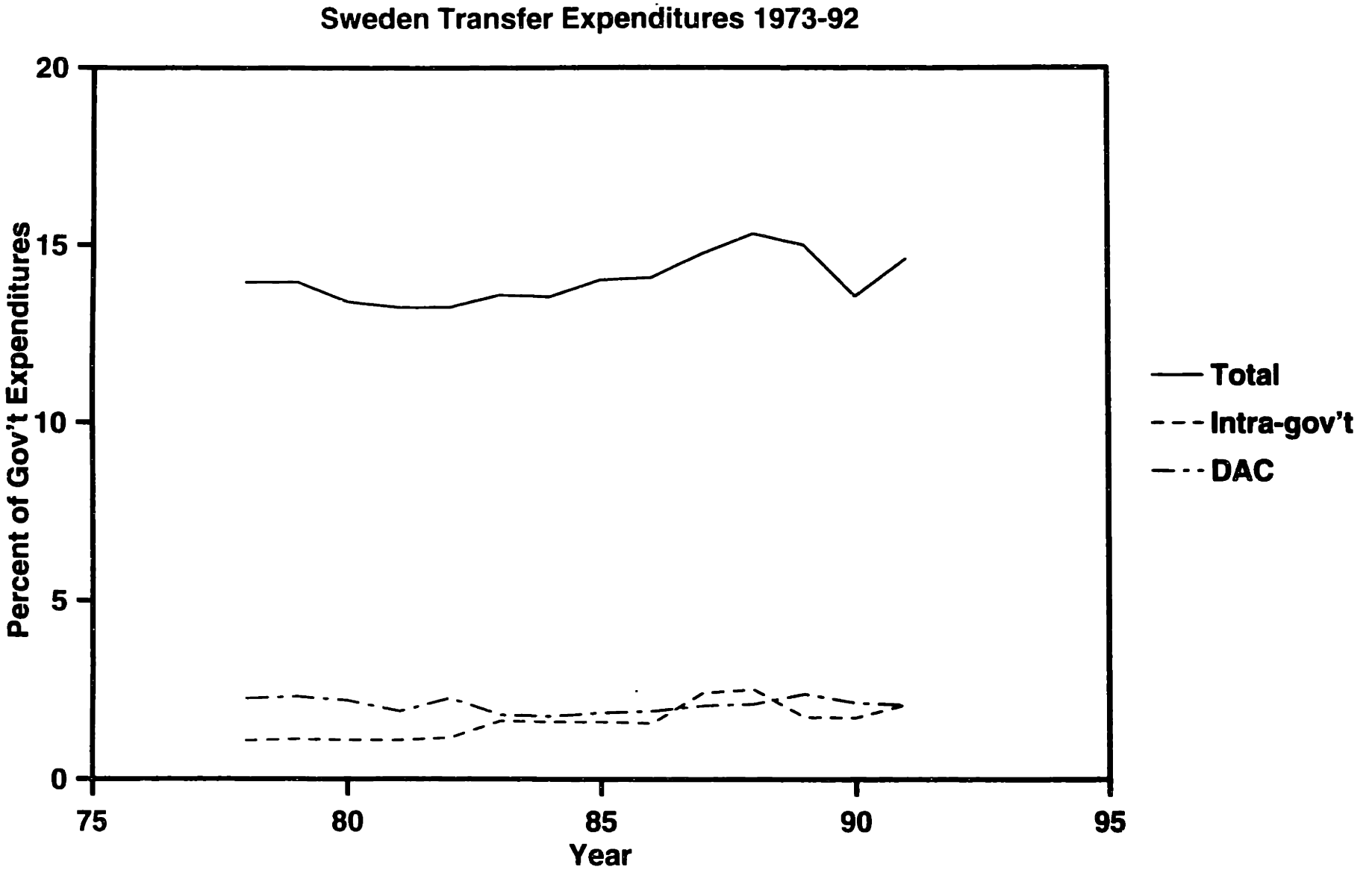
Percent of Gov't Expenditures
70
80
90
Year
Total
Industry
Intra-gov't
Households
Transfers Abroad


Sweden Transfer Expenditures 1973-92
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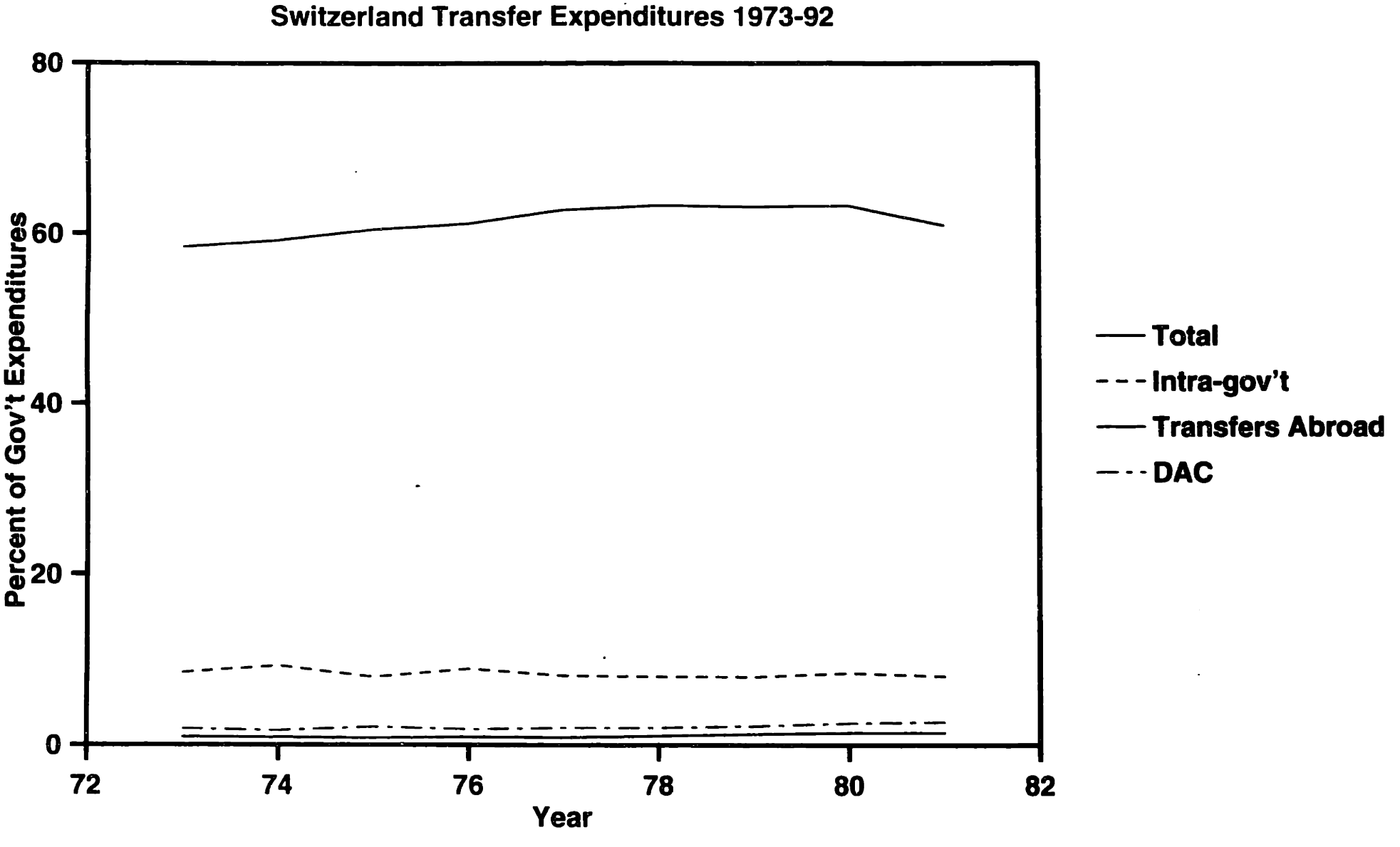
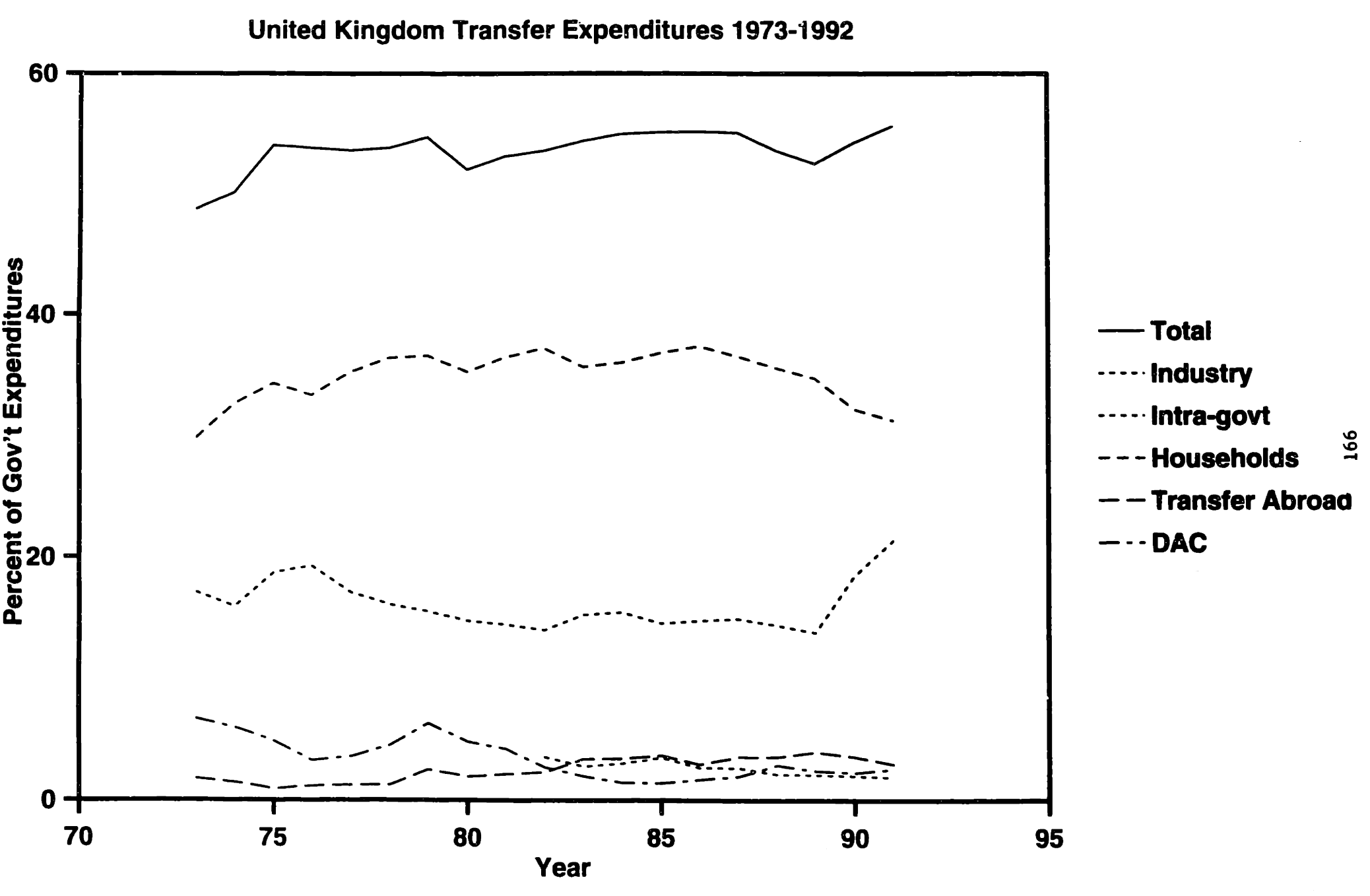
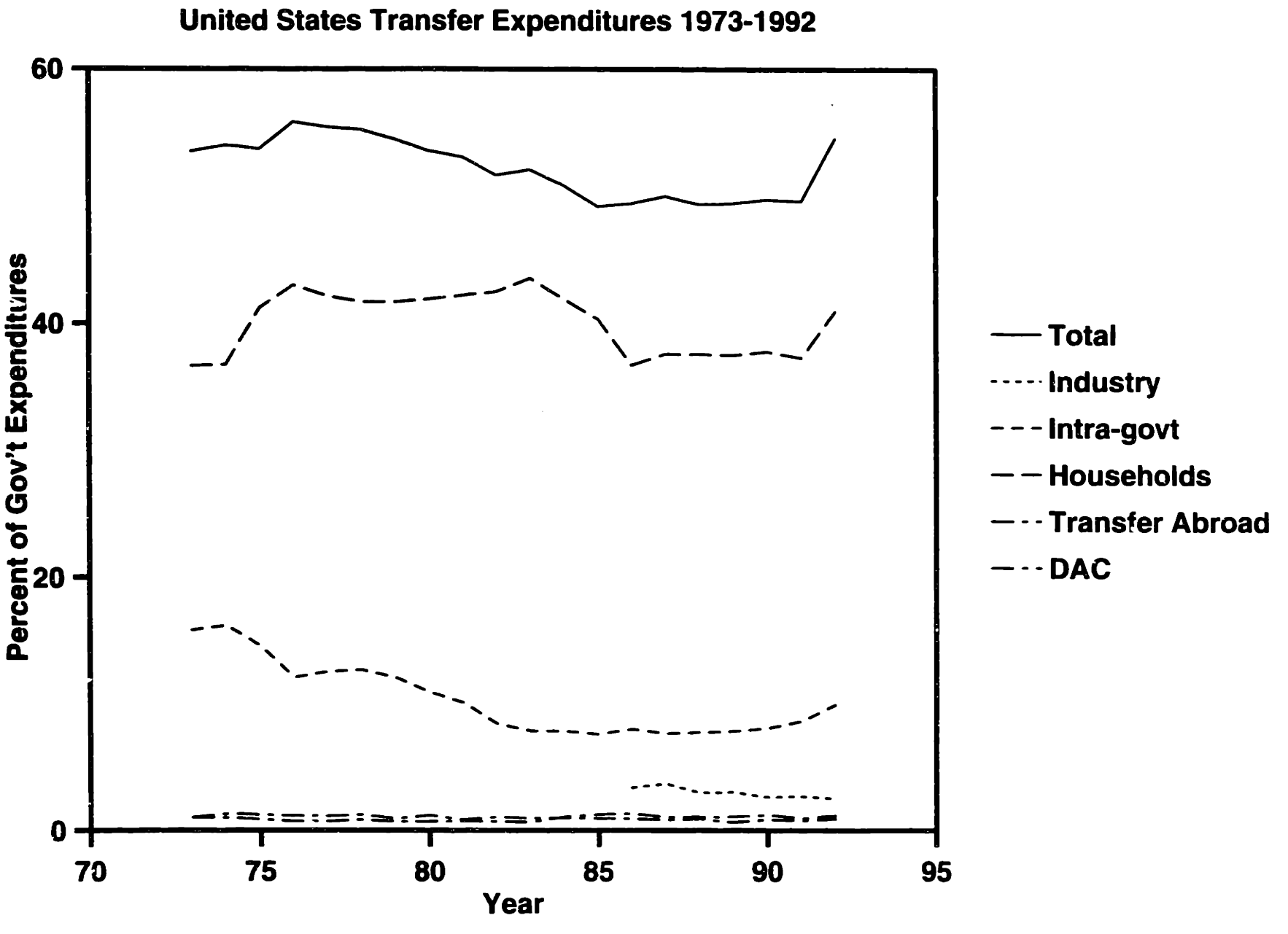
15
10
5
0
Percent of Gov't Expenditures
75
80
85
90
95
Year
Total
Intra-gov't
DAC


Switzerland Transfer Expenditures 1973-92
80
60
40
20
0
Percent of Gov't Expenditures
72
74
76
78
80
82
Year
Total
Intra-gov't
Transfers Abroad
DAC


United Kingdom Transfer Expenditures 1973-1992
60
40
20
0
Percent of Gov't Expenditures
70
75
80
85
90
95
Year
Total
Industry
Intra-govt
Households
Transfer Abroad
DAC


United States Transfer Expenditures 1973-1992
60
40
20
0
Percent of Gov't Expenditures
70
75
80
85
90
95
Year
Total
Industry
Intra-govt
Households
Transfer Abroad
DAC