A General Presentation-Framework For Stabilization Policy

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CONTENTS

Symbols

The curves:

IS	IS-curve
LM	LM-curve
x-u	x-u relation
PC	Phillips Curve
TR	Taylor Rule

The axises:

R	nominal rate of interest
r	real rate of interes
x	rate of capacity utilization
u	rate of unemployment
π	inflation rate

The variables:

Q	GDP
QP	potential GDP
QP^C	potential GDP restricted by capital
QP^L	potential GDP restricted by labour
H	hours worked
H^S	standard hours
L	number of employed people
L^F	labour force (number of people employed if there is no shortage of capital or demand)
U	number of people unemployed because of shortage of capital or demand
U^t	total number of people unemployed
U^C	number of people unemployed due to lack of capital
U^d	number of people unemployed due to lack of demand
U^f	number of people unemployed due to frictions
u^n	natural rate of unemployment, Non-Accelerating-Inflation Rate of Unemployment (NAIRU)
u^f	frictional rate of unemployment
u_d	cyclical rate of unemployment
u_c	structural rate of unemployment
V	volume of labour (in hours)
μ	normal labour productivity
ν	normal capital productivity

I. Introduction

Successful stabilization policy not only needs effective instruments and reliable indicators but also an usable theoretical framework. Since the breakdown of the „consensus model vintage 1970“ (Tobin 1980), among economists there was no agreement on such a framework. Reality was seen too complex to be scetched in a handy model.

One session of the 1997-meeting of the American Economic Association was labeled „Is There a Core of Usable Macroeconomics We Should All Believe In?“ with Robert M. Solow, John B. Taylor, Martin Eichenbaum, Alan S. Blinder and Oliver Blanchard as contributers. In their answers some topics repeatedly were mentioned: The IS-LM model, the Phillips Curve and the NAIRU, Okun's Law, expectations, rules for monetary policy, and factor productivity as the driving force for growth of potential output.Obviously all answers are „opportunistically“ in Solow's sense: it was chosen „whatever works“ (p. 231). There was no attempt to integrate these topics into something really usable.

In his paper Mankiw critizises that “recent developments in business cycle theory, ..., had close to zero impact on practical policymaking” (Mankiw 2006, p. 16). As later research has not contributed much to “macroeconomic engineering” (Mankiw 2006, p. 20) it can be assumed that the brain-model usually consists of elements known for decades.

On the contrary Woodford lists the following elements of models of a new synthesis (Woodford 2009, pp 269ff): (1) coherent intertemporal general-equilibrium foundations, (2) based on econometrically validated structural models, (3) model (rational) expectations as endogenous, (4) real disturbances are an important source of economic fluctuations and (5) monetary policy is effective as means of inflation control. Representatives of this new synthesis are amng others Dynamic Stochastic General-Equilibrium (DSGE) models of actual vintage.

Indeed, these new models - not only DSGE models - are not handy. How to explain their results and the measures taken in consequence to politicans or journalists, whose profession is to explain in simply-to-understand words to a wide public complicated issues they never understand by themselves?

This paper offers a framework that may help. It looks for an as-simple-as-possible presentation that combines useful concepts for stabilization policy. Not surprisingly, our candidates are all among those of Solow & Co. This framework can be used to display any model that is able to produce an IS-curve, a Phillips Curve a monetary policy function and covers the process of factor substitution. It's advantage is the simplicity of presentation that allows even non-economists to recognize the problems of an economy in a certain period.

To fit the components together we had to make some modifications. Especially Okun's Law (Okun 1970) had to be replaced by the x-u relation. Instead of the standard three-equations-models (e.g. Woodford 2003) we have four graphs. We split the today widely used New Keynesian Phillips Curve that relates the output gap to the rate of inflation into the traditional expectations-augmented Phillips Curve and the x-u relation. Thus the process of factor substitution, more exactly: the requirement for factor substitution, is covered.

As monetary policy function we employ the Taylor Rule, which is standard. The result is a graphical presentation, that covers important parts of the economy (however modeled): demand and supply for goods, money and labour, the wage-price mechanism and monetary policy. In it's core it is a combination of four graphs: the IS graph, the x-u relation, the Phillips Curve and the Taylor Rule.

In the short-run this framework describes stabilization policy in the traditional Keynesian way: Starting in a situation with underemployment, higher public spending or lower interest rates lead to an expansion in aggregate demand and may result in full employment. But if there is structural unemployment or economic agents do change their expectations on inflation (which result in shifts of the Phillips Curve) this short-run equlibrium causes or aggravates medium-term disequilibria. As all variables used on the axes are stationary, this presentation even covers growth.

This framework is too simple to describe the time-paths of changes; but it shows what has to change how and it gives the conditions of a „golden age" of short-run, medium-term and long-run equlibrium - the „never-never land". With this overall equilibrium as a reference, the state of the economy can be scetched graphically in a comparative static way. So the next question is, whether this representation gives useful informations for stabilization policy.

The paper is organized as follows: Chapter II presents the components of our framework and shows some basic applications. In chapter III some refinements take place, i.e. we open the economy and introduce growth. Finally we give some concluding remarks on caveats and further research (chapter IV).

II. Components

In this chapter we describe the components of our framework. The main ingredients are the IS-curve, the x-u relation, the Phillips Curve and the Taylor Rule which describes the monetary policy of the central banks.

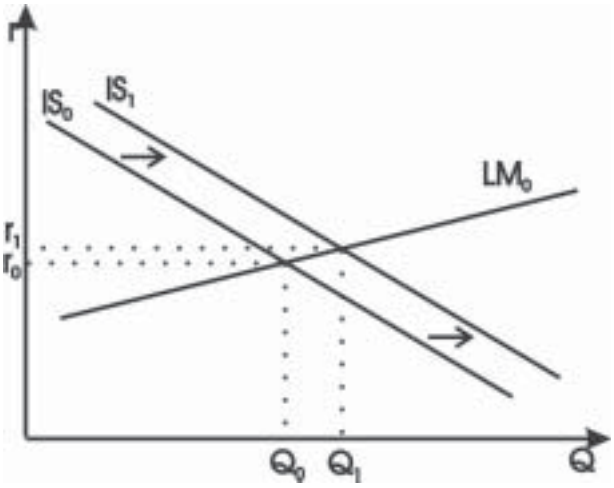

Fig. II.1 A Rise in Government Expanditure in the Standard IS-LM-Framework (without accomodation)

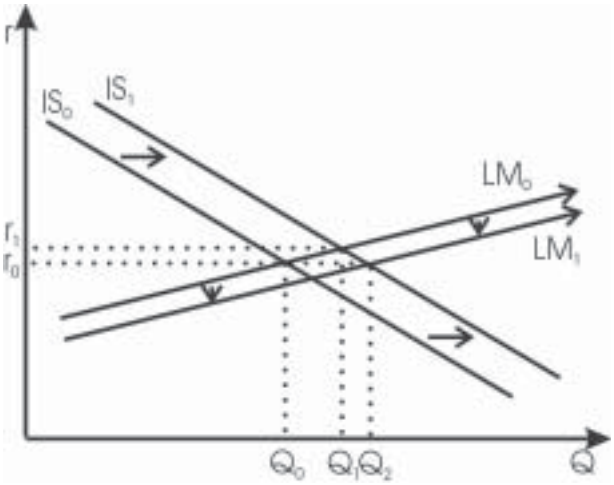

Fig. II.2 A Rise in Government Expanditure in the Standard IS-LM-Framework (with accomodation)

II.1 IS-Curve

The first ingredient is a modified IS presentation. As known from text-books, the IS-curve represents the geometrical locus of all combinations of the long-run real rate of interest (r) and real gross domestic product (GDP, symbol: Q) where investment equals saving. In the r-Q-space this curve is downward sloped and it gets steeper when investment reacts lesser to changes in interest-rates, the multiplier is lower and the productivity of capital increases. Higher government expenditure, expected demand or real private wealth shifts the curve to the right.

In it's original representations the IS-curve is combined with the LM-curve.The LM-curve represents the geometrical locus of all combinations of the real rate of interest and gross domestic product, where money-demand equals money-supply. This curve is upward sloped in the r-Q space and it gets steeper the lower the interest-elasticity of money-demand and the stronger the reaction of the long-run interest rate is to changes in the short-run interest rate. Higher private wealth, price-level or expected inflation shifts the LM-curve up, an increase in money-supply down.

This all is nothing new but known from textbooks (e.g. Westphal 1988a, pp 380 - 385, less elaborated: Samuelson/Nordhaus 1987, pp. 567 - 575, Romer 1996, pp. 197 - 205 and Burda/Wyplosz 2003, pp. 271 - 278). Remember that this analysis is basicly short-run, i.e. prices are assumed not to change. This is motivated by the assumption that we start in a situation with unemployment and underutilized capital stock. In Fig. II.1 we plot the IS- and LM-curve before and after a permanent increase in government expenditure. This act of stabilization policy leads to higher aggregate demand, more

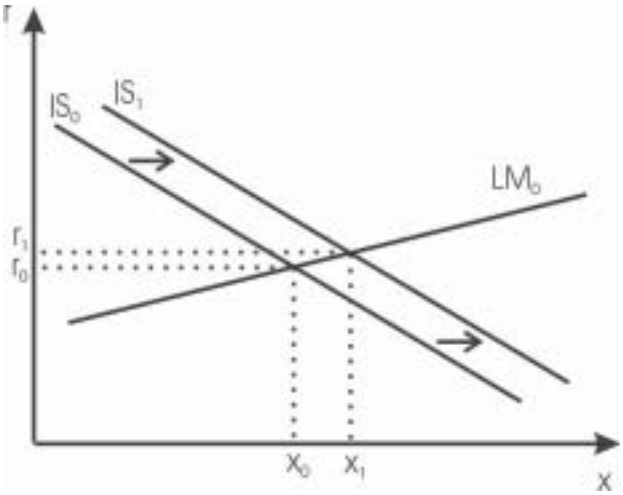

Fig. II.3 A Rise in Government Expanditure in the Modified IS-LM-Framework (without accomodation)

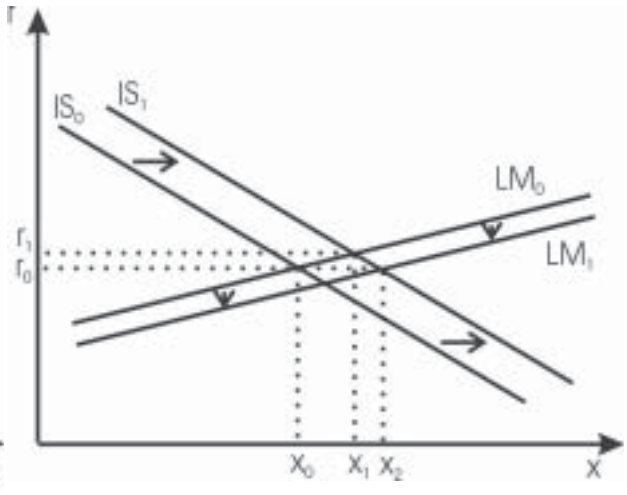

Fig. II.4 A Rise in Government Expanditure in the Modified IS-LM-Framework (with accomodation)

production, employment and income and via the multiplier to a higher level of GDP. Higher income means more demand for transaction money, thus the interest rate goes up. We end in a new equlibrium with higher GDP and interest rate. This rise in the interest rate tends to reduce investment, but as long as the multiplier exceeds unity, GDP is higher than before. Graphically this is represented by a shift of the IS-curve to the right (from IS_0 to IS_1) with the new equlibrium values Q_1 and r_1.

In this argument the central bank was passiv, i.e. it accepted a higher rate of interest. If she does not want to see retarding influences on private fixed investment and consumption, she has to raise the money supply. As interest rates are not up, this accomodation by the central bank results in an even higher GDP. Graphically the increase in money supply means a downward shift of the LM-curve and we have a new equlibrium at the intersection of IS_1 and LM_1 with the equlibrium-values r_0 and Q_2 (see Fig. II.2).

In the real world central banks try to steer the money supply by setting conditions for private banks to get high powered money, i.e. take influence on the nominal short-term interest rates. The private sectors adjust their portfolio-choice and investment decision according to changes in the real rate of interest. Assuming constant prices (short run analysis), nominal and real interest rates move pari passu.

A cut in short-term nominal interest rates results in a lower real rate of interest. Costs for credits for investment and consumption are reduced, demand rises and the result is a higher output. Graphically

the LM-curve shifts downward and we end in the point (r_1,Q_2) where the LM_1-curve intersects the IS_0-curve (see the second step in Fig. II.2).

Befor taking the next step we make a little transformation. Dividing output by potential output gives the rate of utilization (x) of potential output, which is nothing else than today's widely used „output-gap". In the short run, the capital stock and thus potential output does not change. So it makes no difference whether we take output (Q) or the utilization rate (x) (Fig, II.3 and II.4).

II.2 The x-u Relation

The second component of our framework is the relation between the utilization rate of potential output and the unemployment rate (which is an utilization rate of the labour force). But what is potential output? Is it the technically maximum output that can be produced according to the factors of production (i.e. capital and labour)? Or is it the output that can be produced using the factors of production on normal levels? We follow the concept of normal use, motivated by a look at the labour market. The volume of labour can be defined as the number of persons times the hours they work. If we take standard hours as they are fixed in collective contracts or labor-laws, we have the standard (or normal) volume of labour.

With these two factors of production we have two potential outputs: the amount of goods and services that can be produced utilizing the existing stock of capital at its normal rate (assuming that sufficient labour is available) or the amount of goods and services that can be produced utilizing the existing labour force at standard hours (assuming that sufficient capital stock is available). In models with perfectly flexible prices and wages both will be equal. But we live in a world with sticky prices and wages. Thus the factor which is scarcer restricts possible output and gives potential output. Which of the both is scarcer may (and will) change over time (Vogt 1964).

Taking L^F for labour force (i.e. the number of people who are willing to work at given labour-market standards if there is no shortage of capital or demand), L for the number of people employed and U for the number of people unemployed gives the following definition:

$$U = L^F - L \qquad (1).$$

Let H^S be the standard hours and Q the output L workers produce during standard hours. This gives us the definition of normal labour productivity:

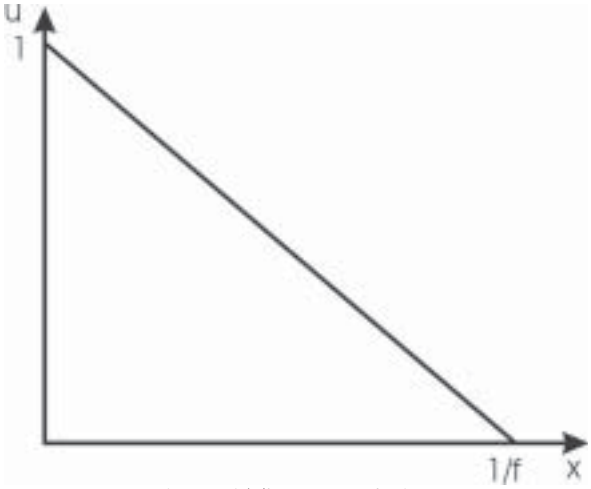

Fig. II.5 The x-u Relation

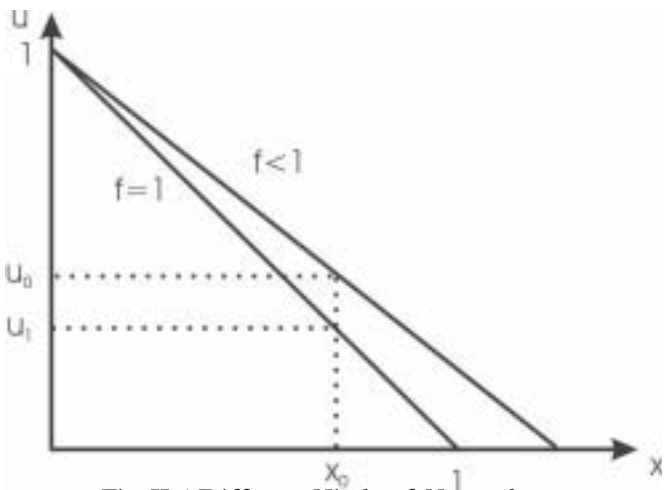

Fig. II.6 Different Kinds of Unemployment in the x-u Relation

$$\mu = Q / (H^S * L) \qquad (2)$$

Dividing (1) by L^F, solving (2) for L and inserting gives the following expression for the rate of unemployment (u):

$$u = 1 - Q/(\mu * H^S * L^F) \qquad (3).$$

The term $(\mu * H^S * L^F)$ is the output that can be produced employing all the labour-force at standard-hours, i.e. under nomal conditions. In other words: it is the potential output if potential output were restricted by labour:

$$QP^L = \mu * H^S * L^F \qquad (4).$$

Potential output can as well be restricted by capital. With K the capital stock an ν the normal capital productivity we have:

$$QP^C = \nu * K \qquad (5).$$

Expanding equation (3) with potential output restricted by capital (QP^C) we get:

$$u = 1 - 1/\mu * (Q/(H^S * L^F)) * (QP^C/QP^C).$$

Rearranging gives:

$$u = 1 - (Q/QP^C) * (QP^C/QP^L),$$

where Q/QP^C is the rate of capital-utilization x. We define $QP^C/QP^L = f$ and finally have:

$$u = 1 - x * f \qquad (6).$$

We plot this relation in the x-u space (Fig. II.5). The intersections with the axes are 1 (x = 0) and 1/f (u = 0).

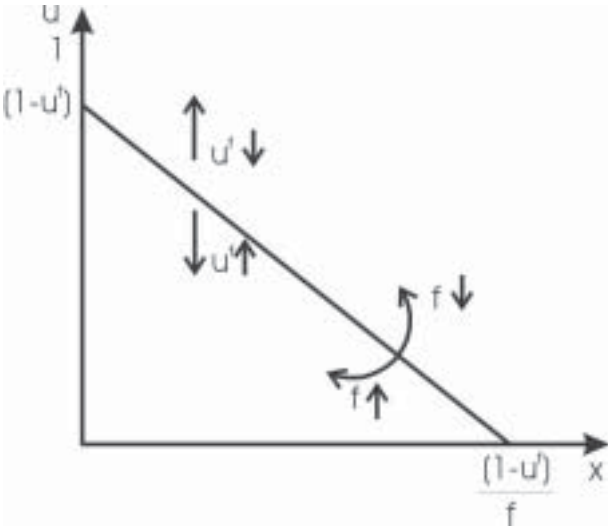

Fig. II.7 The Modified x-u Relation

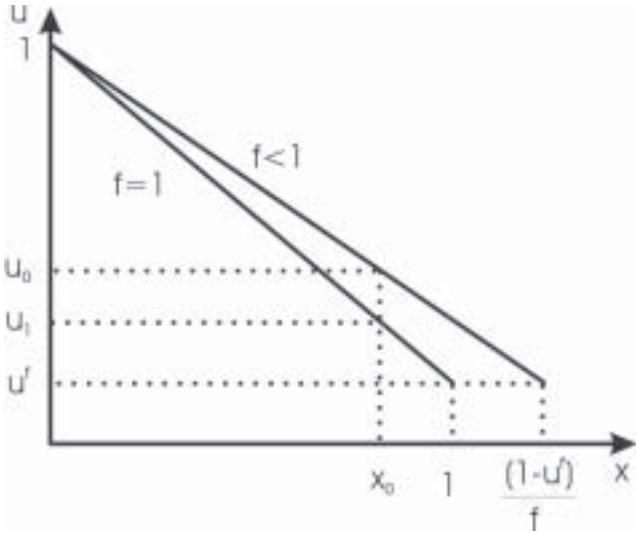

Fig. II.8 Decomposition of Unemployment in the Modified x-u Relation

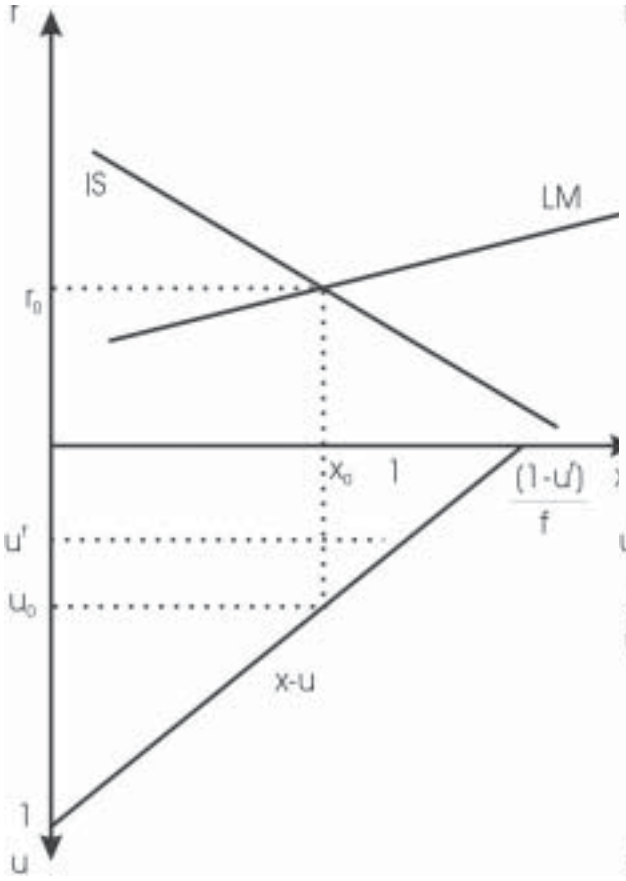

Fig. II.9 The Combined IS-LM and x-u Model

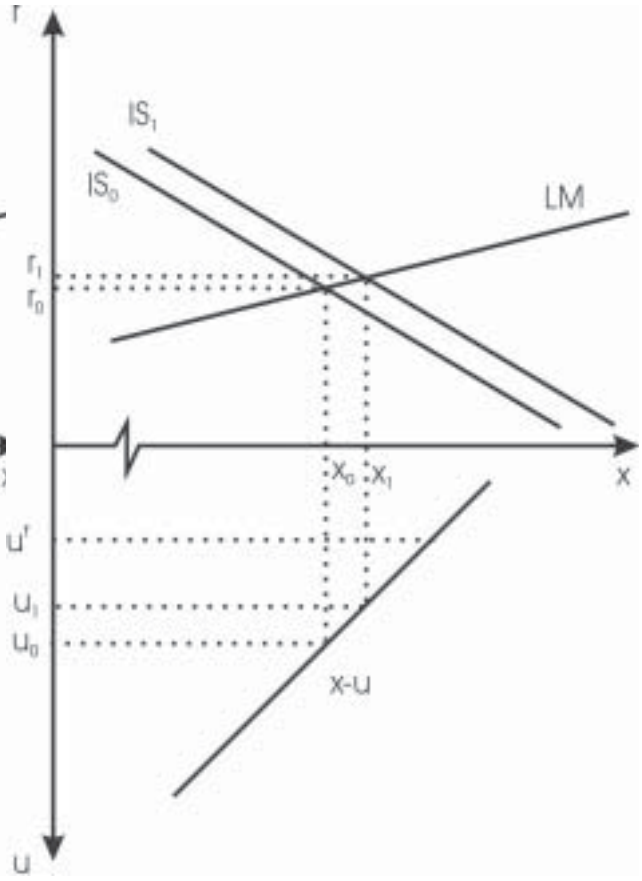

Fig. II.10 An Increase in Govermeant Expenditure in the Combined IS-LM and x-u Model

The slope of this curve depends on the relation of the two potential outputs (f). If both are equal, the slope is -1. When output is restricted by capital, i.e (f < 1) a one unit increase of the utilization rate reduces the unemployment rate by less than one unit: the slope is flatter, in the opposite case steeper. Thus f is a measure for what I earlier called the „substitution requirement" (Stark-Veltel 1987, p. 7): It shows how much factor-substitution c.p. is needed to have both potential outputs equal.

Let's assume the case that potential output is restricted by capital (f < 1). At a certain utilization rate (x_0) we have the unemployment rate u_0 (see Fig. II.6). We now add the x-u relation for the case that the both potential outputs are equal (f = 1) which gives us the unemployment rate $u_1 < u_0$. The interpretation is: The difference $u_0 - u_1$ is unemployment due to lack of capital. And the rest?

The x-u relation for (f = 1) intersects the x-axis in unity, i.e. full capital utilization. There is no unemployment due to lack in demand, and no unemployment due to lack in capital stock. In fact, for f = 1 and x = 1 the graph shows no unemployment at all. This contradicts our experience: there always is a certain amount of unemployed persons due to frictions in the labour market. Their relation to the labour-force usually is called the frictional rate of unemployment.

This frictional rate of unemployment satisfies Friedman's definition (Friedman 1968) of the „natural rate of unemployment". To incorporate this, we split total unemployment into three components: unemployment due to shortage in capital stock (structural unemloyment U^c), due to lack in demand (cyclical unemployment U^d) and due to frictions (frictional unemployment U^f). Let according to our definition of the labor force (L^f) unemployment (U) be the sum of U^c and U^d, then total unemployment U^t is $U+U^f$ or in rates: $u^t = u + u^f$. Modifiing equation (1) gives:

$$U^t = L^F - L \qquad (1\ a)$$

and

$$u = 1 - x * f - u^f \qquad (6\ a).$$

The intersections of the x-u relation with the x-axis are $((1-u^f)/f)$ (for $u = 0$) and with the u-axis are $(1-u^f)$ (for $x = 0$). The slope of the x-u relation is -f. When frictional unemployment increases (decreases), the x-u relation shifts down (up) (see Fig. II.7).

For a clearer graphical representation we shift the curve by u^f (see Fig. II.8). Now u_0 is the unemployment rate, u_0-u_1 is structural unemployment and $u_1 - u^f$ is cyclical unemployment. If there were no frictional unemployment ($u^f = 0$), Figures II.6 and II.8 were identical.

After this modification we can combine the IS-LM curves with the x-u Relation. To do this we mirror the x-u Relation at the x-axis. To concentrate on relevant items, we focus our graphics to the area arround full capacity utilization ($x = 1$) (see Fig. II.9 and II.10).

The effects of a permanent increase in government expenditure are plotted in Fig. II.10. The standard argument is that we start in a situation with unemployment and underutilized capital stock. So expanding output and thus employment poses no pressure on prices and wages. A permanent increase of government spending rises output and as long as fixed investment does not change potential output, the rate of capital utilization is higher than before. Graphically we see this as a shift of the IS-curve to the right. Higher capital utilization means higher demand for labour and less unemployment. We end up with $x_1 > x_0$ and $u_1 < u_0$.

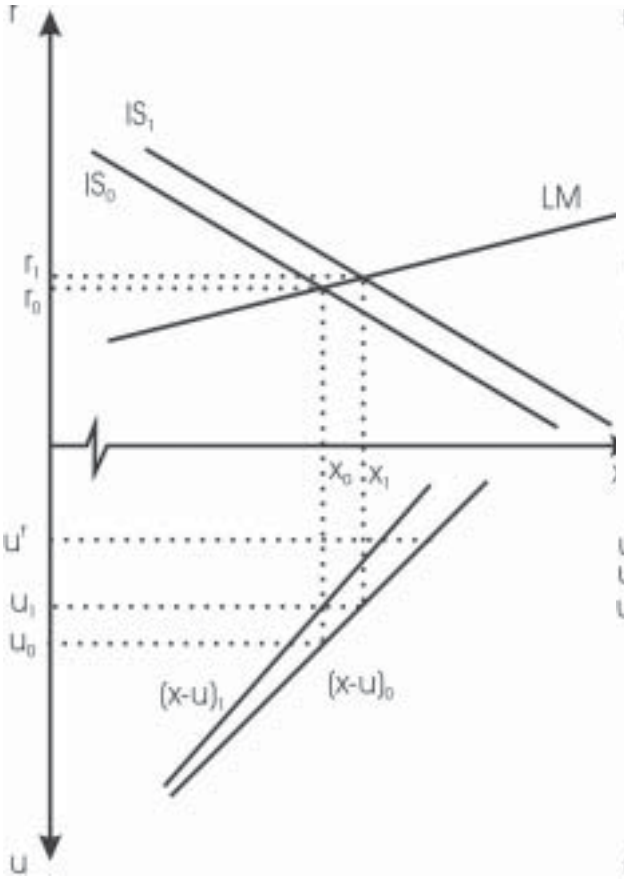

Fig. II.11 Change in the Capital Stock After a Permanant Rise in Government Expenditure

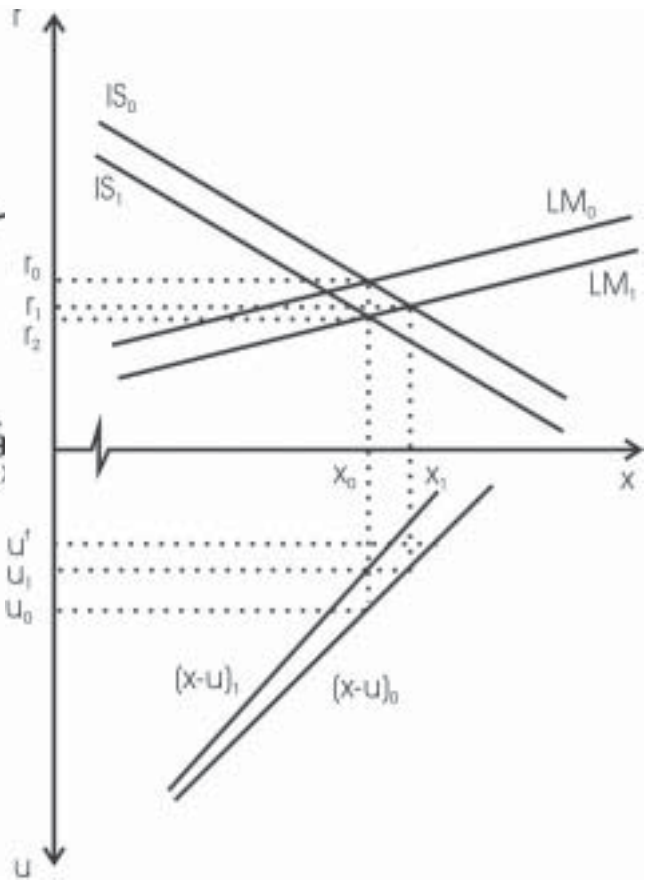

Fig. II.12 Change in the Capital Stock After a Reduction of the Real Rate of Interest

When firms detect an increase in demand they first try to meet it with overtime-work. Only if the change is seen as persistent, overtime-work is reduced as additional workers are hired. Depending on production techniques and labour-laws (how costly is hiring and firing), it may take quite a while before the switch from overtime-work to hiring is done: In a world of ex-ante and ex-post substitutability („putty-putty" technology) a larger labour-force can be combined with an unchanged capital stock. But in a world of ex-post limited production technology („putty-clay") first additional capital stock, i.e. private fixed investment, is needed before additional workers can be hired (Stark-Veltel and Westphal 1985, p. 277). In true life we face both types of technology present at the same time (e.g. „putty-clay" in industry and „putty-putty" in services). In an economy with rigid labour-laws or -jurisdiction, i.e. where firing is very costly, adjustment to changes in demand are more likely done via variing the hours and productivity (investing into more capital-intensive technology) of those in work and not via hiring and firing. Note that neither production technology nor labour-laws or -jurisdiction affect the slope of the x-u relation. What they affect is the time-profile of changes in employment.

This analysis is made under the assumption that we have underemployed resources, i.e. an utilization rate below unity. But if the permanent increase in government expenditure rises the utilization rate above unity, i.e. all capital stock is employed, there is pressure for investment in additional machines.

As soon as the capital stock is changed, the IS-curve and the x-u relation start to move. The IS-curve shifts to the left (we have the same output with a lower rate of capital utilization) and the x-u relation turns right (in the original graph as QP^L remains unchanged while QP^C rises, i.e. in the mirrored relation it turns left). This rise in the capital stock increases the number of working-places and - as long as demand and the rate of capital utilization is not reduced for other reasons - reduces unemployment. In Fig. II.11 we assumed that investment creates as many working-places as needed to keep unemployment constant at the reduced rate (u_1). In our graph this happens to be combined with the original IS-curve, i.e. the original real rate of interest (r_0) and the original rate of capital utilization (x_0). But this is only to reduce complexity of the graph. We might have drawn new lines as well.

An act of monetary policy, e.g. a reduction of the real rate of interest from r_0 to r_1 (graphically a downward-shift of the LM-curve; see Fig. II.12) expands private consumption and investment by reducing credit costs. The rate of capital utilization rises (from x_0 to x_1) and unemployment is reduced (from u_0 to u_1). Again the x-u relation is affected as soon as additional capital stock enters the production process. In terms of our graph: The IS-curve shifts to the left (the same output is produced with a higher capital stock) and the x-u relation turns left. Due to the reduction in the rate of capital utilization we end up with a further reduced real rate of interest (r_2). Again we assumed that we end with the unchanged unemployment rate u_1 just to reduce complexity of the graph.

II.3 Phillips Curve

Our next component is the Phillips Curve (PC), a relation between the rate of unemployment and the rate of inflation, which Alban Phillips described in his seminal 1958 paper. During the 1960's this relation was assumed to be stable. In effect it was seen as a menu-card for stabilization policy: choose the combination of inflation and unemployment you want and adjust monetary and fiscal policy accordingly (Fig. II.13).

But the Phillips Curve proved not to be stable. Starting with zero inflation and an unemployment rate of u_0, an increase in government expenditure rises the demand for labour. Employers offer higher wages and give employees new employment opportunities. This reduces unemployment to u_1. At the same time higher wage costs are transformed into higher prices and the inflation rate rises to π_1, the

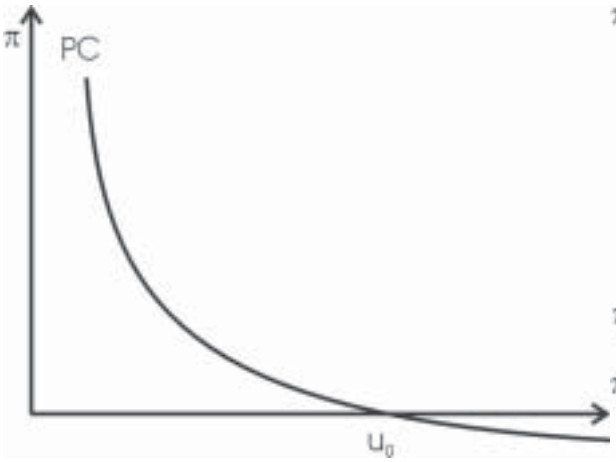

Fig. II.13 The Phillips Curve

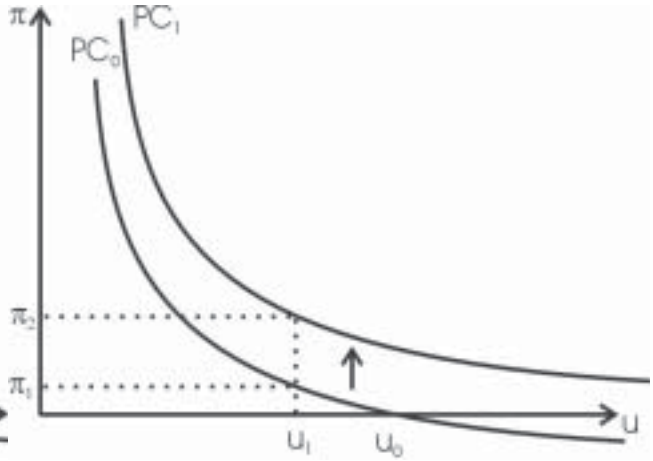

Fig. II.14 Expectations Shifting the Phillips Curve

real wage and thus labour costs go down and more labour is hired. After some time workers recognize that their nominal wages-increase was no permanent increase in real wages. They adjust their inflation-expectations to the new rate of inflation and demand for further increases in their wages. Thus the new level of unemployment (u_1) can only be sustained with a higher inflation rate (π_2): the Phillips Curve has moved (Fig. II.14).

To reduce inflation, a contraction is needed with rising unemployment. Constant prices can be reached only at the unemployment rate u_0. To reduce inflation, unemployment has to rise above this rate (u_0) until expected inflation is back to nil. Graphically this means that the Phillips Curve has moved back to its original place. To sum up: In the short-run the Phillips Curve offers a trade-off between inflation and unemployment, but in the long-run an unemployment rate below u_0 cannot be sustained. And: only when unemployment equals u_0 the expected rate of inflation equals the actual rate and expectations need not be changed. This means that the long-run Phillips Curve is vertical and this unemployment rate has the property of not changing the inflation expectation and thus not shifting the short-run Phillips Curve. This unemployment rate u_0 is also called the „Non-Accelerating-Inflation Rate of Unemployment" (NAIRU).

Our next step is to integrate the Phillips Curve into our graph with the IS-LM-curve and x-u relation. PC-curve and x-u relation have in common the u-axis. So we put the PC-curve it into the south-west quadrant of our graph (Fig. II.15). This figure shows a situation of overall equlibrium (the long-run equilibirium values of the variables and the long-run equilibirium positons of the curves are marked with an *): in the goods- and money-market, in the labour-market (the NAIRU equals the frictional rate) and it shows absence of inflation: the never-never land.

Fig. II.16 shows a situation out of equilibrium, as it was typical for short-run Keynesian analysis: The economy is in an underemployment-equilibrium with stable prices (curves IS_0 and LM_0). Both factors, capital an labour, are underemployed (x_0 and u_0 respectively).

Consider now a permanent increase in government expenditure. We have more demand, more production, a higher rate of capital utilization and more employment. This is shown by a shift of the IS-curve to the right (IS_1). The new (higher) utilization rate is x_1 and the new (lower) unemployment rate is u_1, the new real rate of interest is r_1 (higher).

Suppose now, the central bank expands money supply and thus the LM curve shifts down (LM_1). The real rate of interest is reduced (r_2), demand, production and employment are even more up. The new

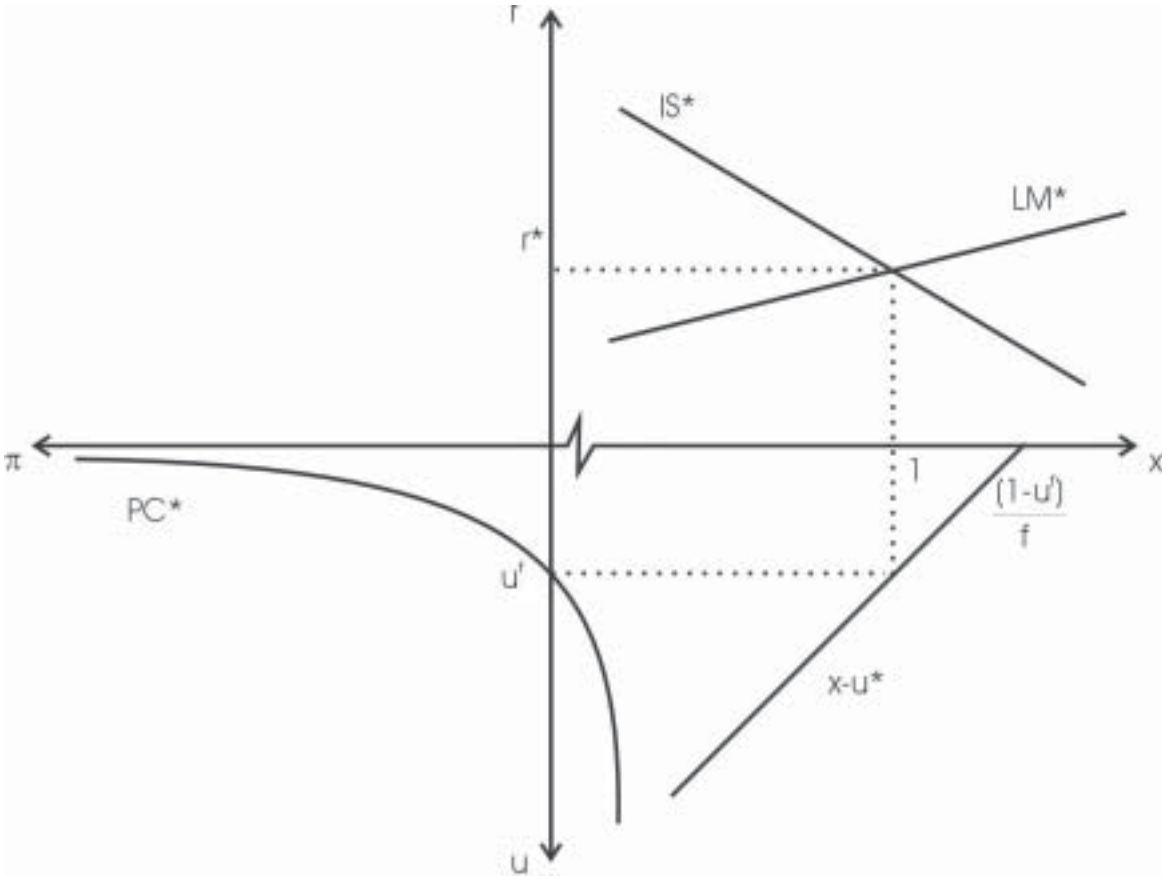

Fig. II.15: The Combined IS-LM, x-u and PC System in Equilibrium

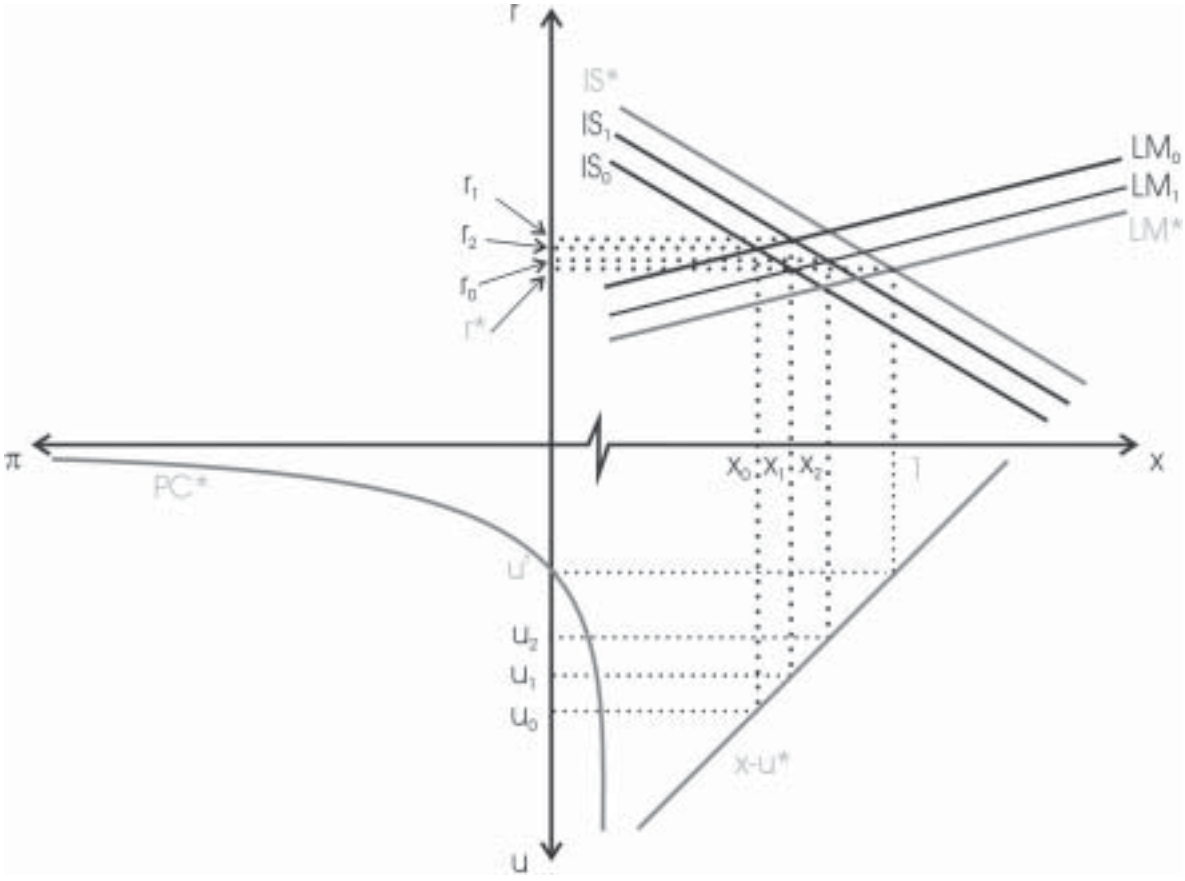

Fig. II.16: Expansionary Fiscal and Monetary Policy in the IS-LM - x-u - PC System: The Keynesian Case

situation is described by a higher rate of capital utilization (x_2) and a lower rate of unemployment (u_2), both closer to their equilibrium values as is the new real rate of interest (r_2). Now we are very close to the dreams of stabilization-policy makers of the 1960's: Just tune fiscal and monetary policy fine and you can reach the overall equlibrium.

There is no over-utilization and no rising tensions in the goods- and labour-market that could drive wages and prices up. The Phillips Curve is in its equilibrium position and the inflation rate is not really affected by these policies. Indeed, our story sounds like a fairy-tale.

But what makes the difference between our fairy-tale and the real world? First, there is a row of factors that can be neglected in a model but not in reality: uncertainty, lags, political issues. Uncertainty means that we do never know, what the actual situation of the economy is. To raise statistical data takes time and the data have lots of mistakes. Annother branch of uncertainty is that we do not know whether our model is qualitatively correct and even if it is, whether it will be quantitatively. Lags describe that it takes time to make decisions and to implement stabilizing measures. The economic situation might turn during these processes. On top of this political considerations may lead to a timing of stabilization policy consistent with electoral cycles and not with the bussiness cycle.

Second, we have to qualify our placing of the Phillips Curve. In the real world there is no unique labour-market but but there are different segements according to profession, educational level etc. In each of these labour-market segments the reaction to changes in the relation of demand and supply is asymmetrical: when labour-demand exceeds supply (nominal) wages go up, in the opposite case nominal wages usually do not go down. Even in a recession some segments of the labour market will have excess demand so that wages do go up there while in the bulk of the segments wages do not go

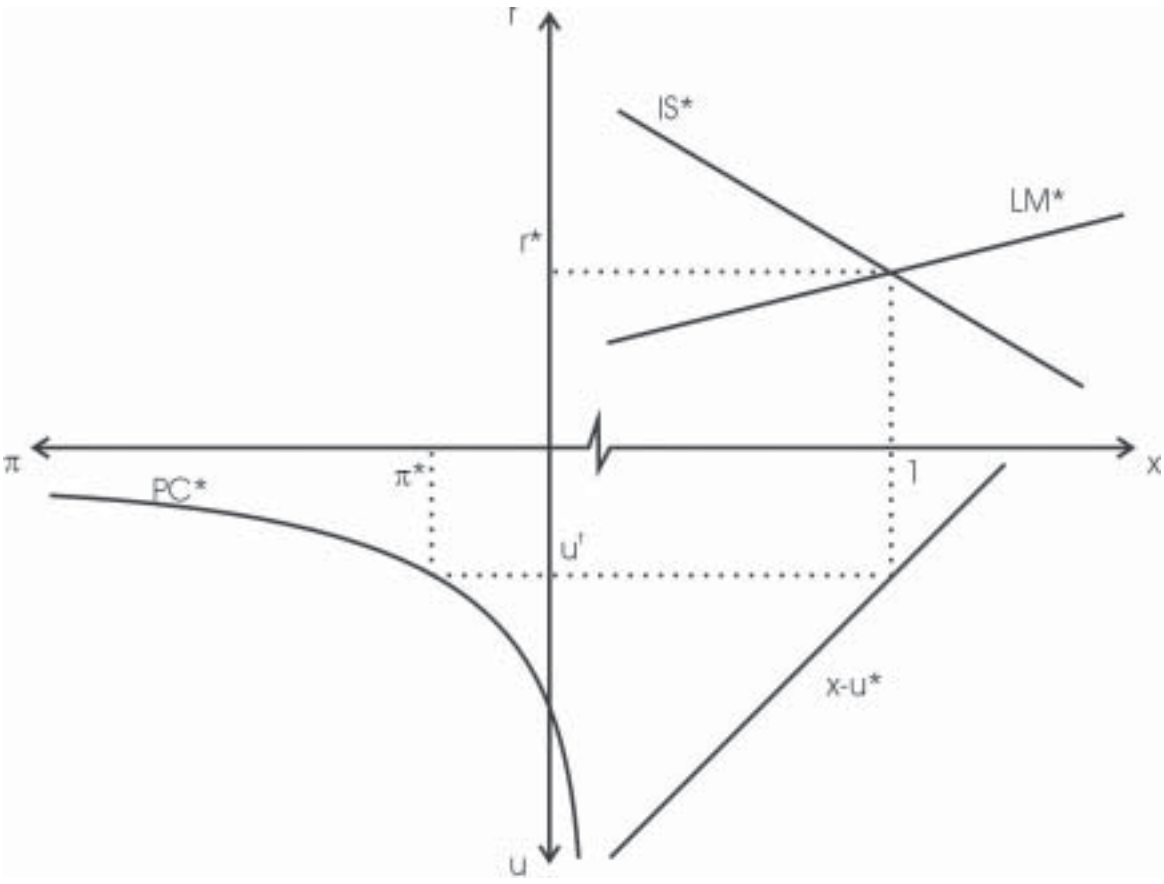

Fig. II.17: The System with Inflationary Bias

down. Assuming target-return-pricing, prices will follow wages on the aggregate level. This „inflationary bias" leads to rising prices even when on the makro-level the labour market is ballanced, i.e. the rate of unemployment equals the frictional rate ($u = u^f$). Although we do not have stable prices but an inflation rate π^* people do not adjust their inflation-expectations because they recognize diffuse signals: some prices go up, some down, new products have better quality and cost more than those they replace (Fig. II.17). As long as expectations need not be corrected the Phillips Curve will not move.

Now let us look at the ideal situation for Keynesian-style demand management. Fig. II.18 shows us a situation with an underemployment-equilibrium in the goods-market (IS_0). The rate of capital utilization is below unity and the unemployment rate is above the frictional rate. Potential output restricted by capital equals that restricted by labour ($QP^C = QP^L$, i.e. $f = 1$). The rate of inflation is lower than it's equlibrium value. To restore equilibrium an expansionary fiscal policy is needed, i.e. graphically a policy to shift the IS-curve to it's overall equilibrium position. The rate of capital

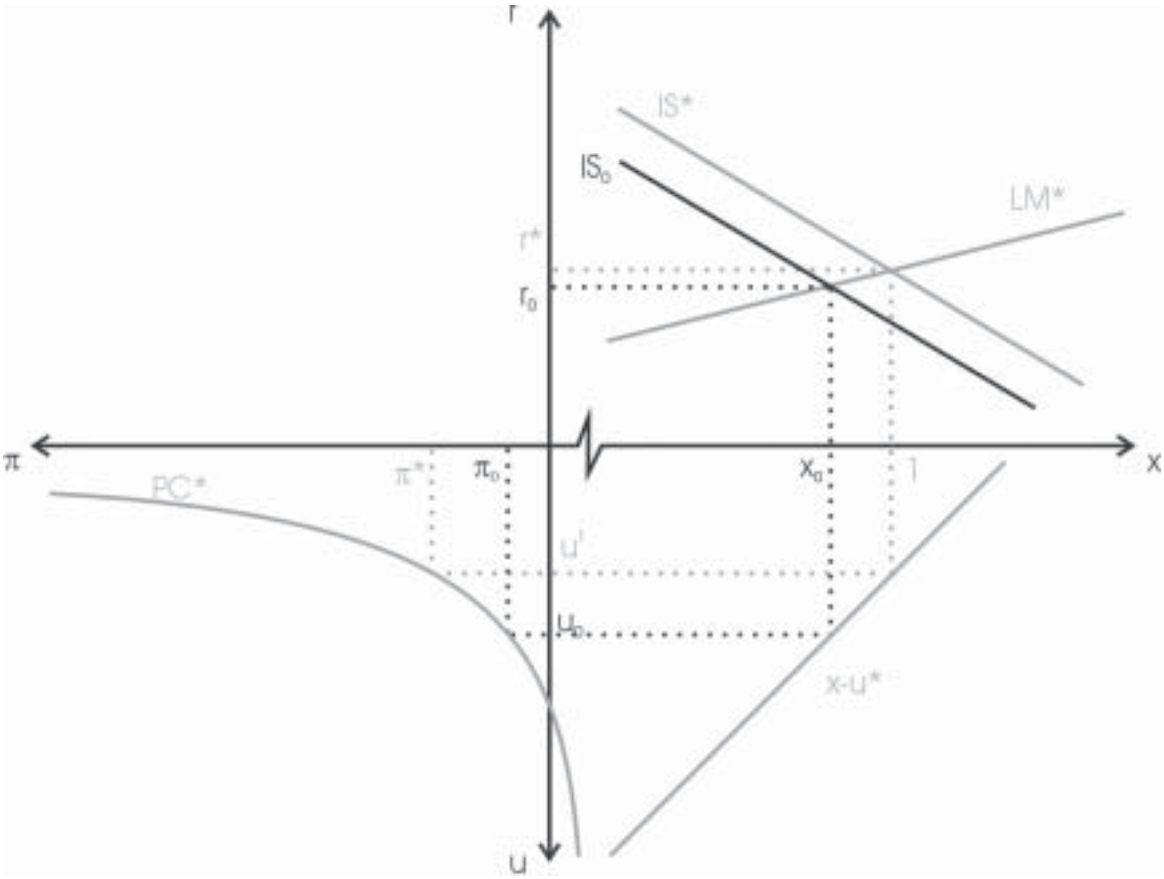

Fig. II.18: Expansionary Fiscal Policy in the IS-LM - x-u - PC System:
The Keynesian Case with Inflationary Bias

utilization is lifted to unity, unemployment reduced to it's frictional level and inflation goes up to it's equlibrium value. This is the textbook-case for fiscal policy. In this argument the influence of changing prices on real wealth, the IS- and LM-curve are neglected.

Now suppose, we start in a situation with a Phillips Curve out of its equilibrium position (e.g. due to past inflation experience). Actual unemployment is $u_0 > u^f$, the utilization-rate is $x_0 < 1$ and the inflation-rate is $\pi_0 > \pi^*$ (see Fig. II. 19). A permanent increase in government expenditure (graphically a shift of the IS-Curve from IS_0 to IS_1) rises the rate of capital utilization (x_1) and lowers unemployment (u_1). As the Phillips Curve PC_0 is valid, workers adjust their inflation-expectations and demand for higher wages which are transmitted to higher inflation (π_1), i.e. the Phillips Curve shifts to PC_1.

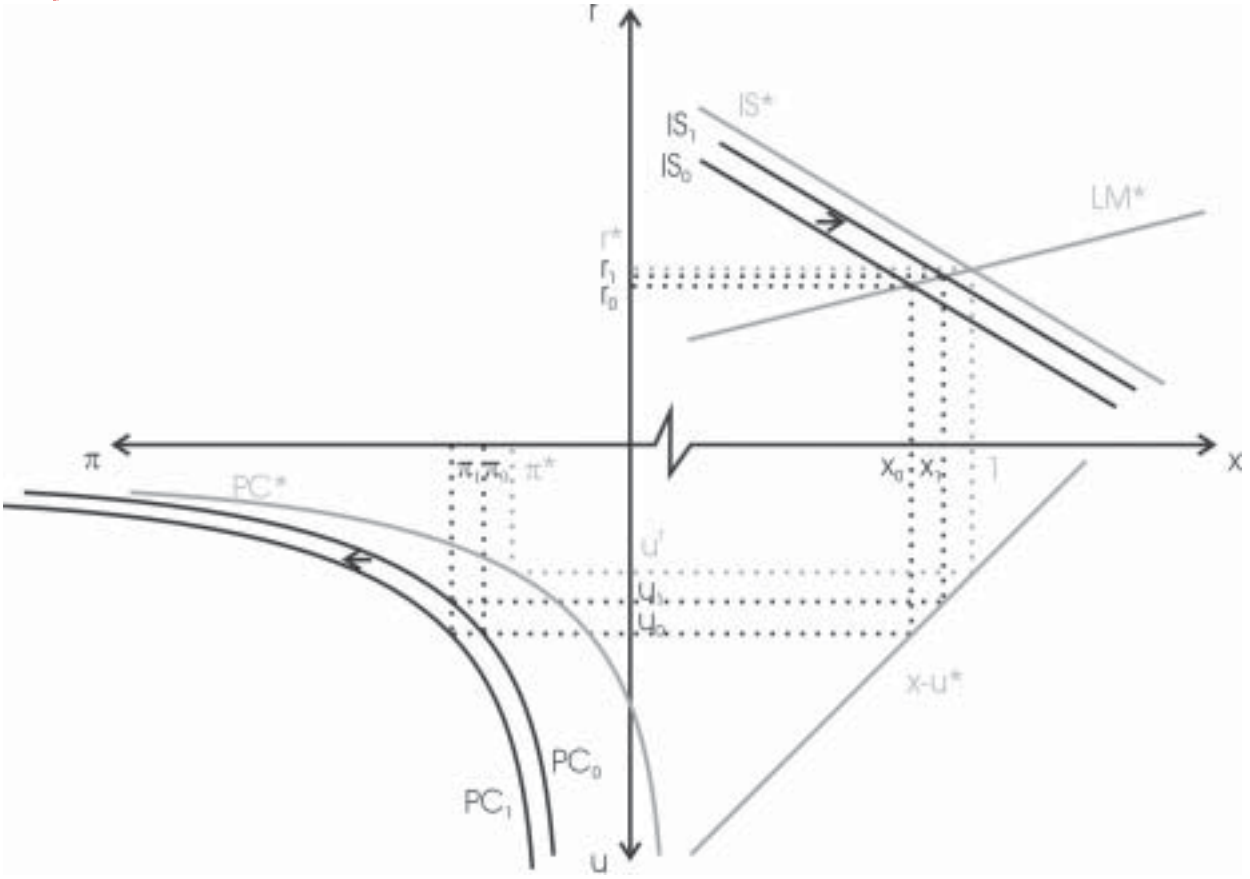

Fig. II.19: Expansionary Fiscal Policy in the IS-LM - x-u - PC System:
When the Phillips Curve Has Moved

Unemployment is back to u_0 and capacity utilization to x_0. As a result fiscal policy has not reduced unemployment but raised inflation.

The adjustment of expectations takes time. But as long as capacities are underemployed there is no reason for net investment and thus a rise in the capital stock that rises potential output and creates new employment. All in all this is a crude description of what happened during the 1970's and discredited Keynesian policy.

But the Phillips Curve not only moves horizontal. We also observe vertical movements, i.e. movements in the NAIRU. Gordon's (1997, p. 14) triangle model of inflation incorporates supply side effects. In his empirical work on the „Time Varying NAIRU" he offers labour militancy and union's strengh as reasons for movements of the NAIRU (Gordon 1997, p. 30). As trade-unions care for those who have a job („insiders") and not for those who do not („outsiders"), they are not willing to accept lower wages for their membership („hysteresis", e.g. Franz/Gordon 1993, pp. 720f, Stiglitz 1997, p. 8). In their 1997 paper Phelps and Zoega (p. 288) found some empirical evidence that changes in the labour force have influence on what they call the natural rate (u^n) which is our NAIRU. In Germany the inflation rate shows a stable relationship to capacitiy utilization and wages, but no feedback from unemployment on wages (Franz/Gordon 1997, p.751). This means that all non-cyclical unemployment moves the (German) Phillips Curve: the NAIRU (or u^n) is the sum of frictional (u^f) and structural (u^c) unemployment ($u^n = u^f+u^c$).

What moves the NAIRU respectively the natural rate? Clearly it is f, the ratio of potential output restricted by capital (QP^C) and potential output restricted by labour (QP^L). The larger the difference between the potential outputs ($QP^C < QP^L$), i.e. the lower f, the higher is the NAIRU. If both poten-

tial outputs coincede (f = 1) the NAIRU is the rate of frictional unemployment (u^f). With the NAIRU the Phillips Curve moves up and down the u-axis. As we already have seen, changes in inflation-expectations shift the Phillips Curve vertical to the u-axis.

II.4 Taylor-Rule

Our system is closed by a monetary policy function describing the behavior of the central bank, which is widely used in recent literature: the Taylor-Rule. As Woodford (2003) proofs for different families of models, equilibrium is determined only when the central bank obeyes the Taylor principle, i.e. she reacts to rises in the rate of inflation with raising the interest rate by more than 1 : 1. How

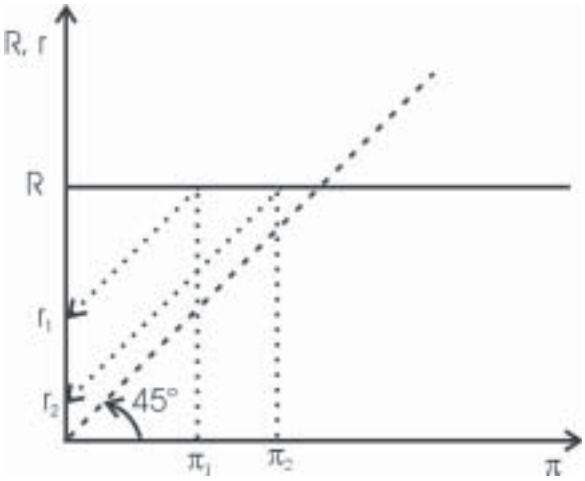

Fig. II.20: The Transformation of Nominal Rates to Real Rates

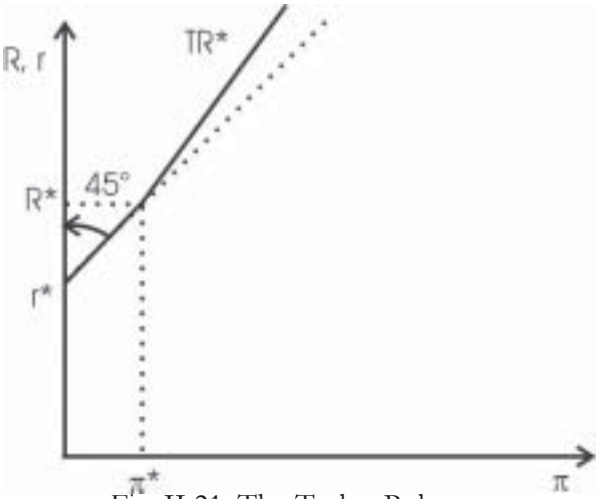

Fig. II.21: The Taylor-Rule

tough she reacts is described by the slope of the TR-curve: the steeper the curve, the tougher her reaction.

Indeed, the European Central Bank watches the short-term real rate as an indicator for the monetary policy stance (ECB 2004, p. 57). In Fig. II.20 we plot the TR-curve in a space with the inflation rate (π) on the horizontal axis and the nominal (R) and real (r) rate of interest on the vertical axis.

In reality central banks set refinancing conditions for private banks and thus short-term nominal interest rates. To close our system we need the long-term real rate that is on the axis of the IS-curve. Thus what we plot is the long-term nominal rate as it is the result of central bank policy and the transformation of the short-term rate through the banking system into a long-term rate. The slope of the TR-curve is the result of both: the setting of short-term nominal interest rates by the central bank and the transmission of these short-term nominal interest rates to nominal long-term interest rates by the banking system. The transformation of the nominal long-term rate to the real long-term rate is easily done in our graphic: A 45°- line transforms nominal rates into the real rates.

The last step to complete our graphical representation is to mirror the TR-graph at the r/R-axis and fit it into the system (Fig. II.22). Now we have all four quadrants filled and can start our analysis in a closed system. With the Taylor-Rule determining the interest rate, the LM-curve as a descriptin for the determination of the interest rate in the money market can be skipped.

Again we assume a situation of under-utilization of potential output (the utilization rate x is below unitiy), both potential outputs beeing equal (i.e. $QP^L = QP^C$, or f =1, i.e. the NAIRU equals the frictional rate u^f), and the IS-curve in a short-run equilibrium position (see IS_0 in Fig. II.23). To reduce unemployment the fiscal authorities rise government spending. As well-known the utilization rate

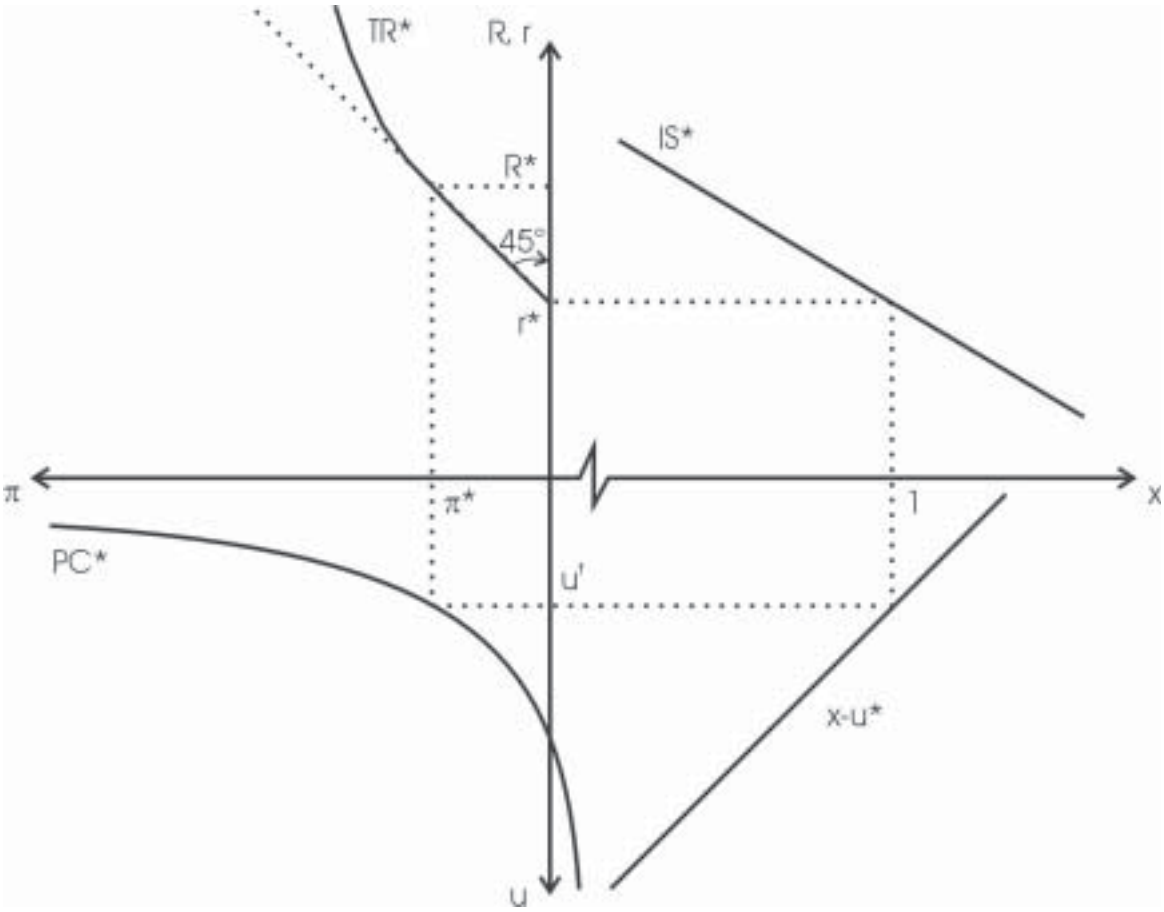

Fig. II.22: The Full System

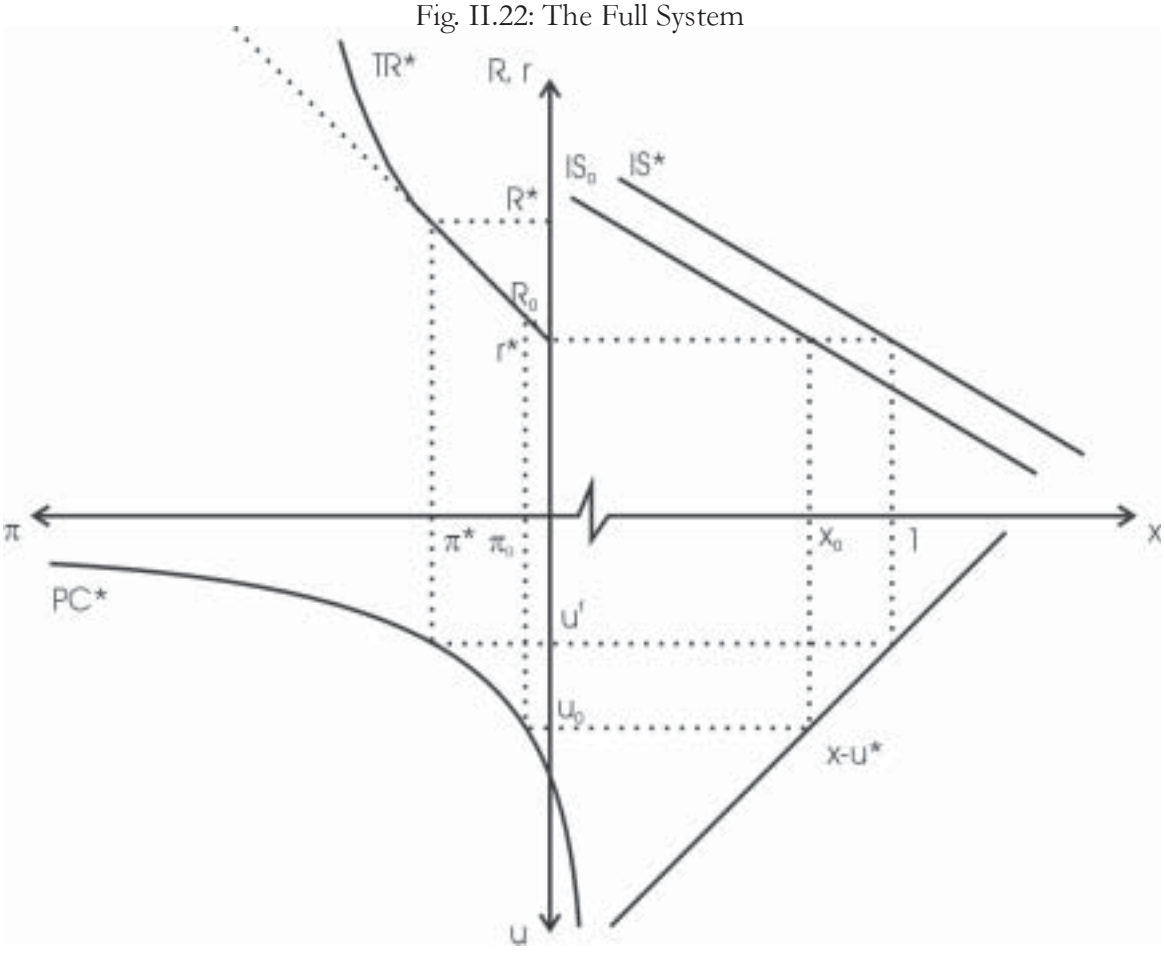

Fig. II.23: Fiscal Policy in the Full System

rises (the IS-curve is shifted to the right), more labour is needed, thus unemployment goes down. As unemployment is above the NAIRU, there is no pressure on prices and wages and no inflation-expectations arise. Following the Taylor-Rule the Central Bank adjusts nominal interes rates to keep real rates constant. As a result the overall equilibirium is reached. This is the text-book case for Keynesian demand management and our completed presentation of the fairy-tale we mentioned above.

III. Some Comments on Open Economy and Growth

So far we have presented our framework for a closed, not growing economy. In the real world economies are open, i.e. there are trade and capital flows between them and they are growing - most the time. In this chapter we discuss how international interactions and growth have influence on our framework and the results of our analysis.

III.1 Open Economy

Open economy variables such as exchange rates, international capital flows, foreign interest rates or world trade do not enter our framework directly. But they may have an influence if the slopes or positions of our curves are affected by them.

At the beginning we have to define the crucial condition: The exchange rate regime and the size of the (domestic) economy. Assuming fixed exchange rates and a small economy (i.e. an economy that does not dominate the international capital market) means that the central bank cannot control the supply of money. To defend the exchange rate, it has to adjust the money supply accordingly. The domestic interest rate is the world interest rate plus the expected inflation-rate (interest parity). For the major economies this is not a realistic setting. The major currencies float against each other and no economy dominates world capital markets. Thus we shall assume flexible interest rates and a (fairly) small economy.

With flexible exchange rates the central bank has control over the domestic money supply. But this means that there is a new channel of transmission: the exchange rate. We have to analyse, what this means for the use of the instruments of stabilization policy.

The IS-curve represents the geometrical locus of all combinations of the long-run real interest rate and the utilization rate of capital where supply of goods equals demand. Both are affected in an open economy: Foreign demand, i.e. exports, and foreign supply, i.e. imports, are part of domestic GDP. An expansion abroad rises exports and thus shifts the IS-curve to the right as does an increase in government expenditure.

Imports usually depend on domestic demand. A rise in demand e.g. as an effect of expansionary fiscal policy, rises domestic production and imports. Thus the effect of that policy on domestic output and the rate of capacity utilization is lower than in a closed economy. Graphically this means that the IS-curve in an open economy is steeper and given the same impetus from fiscal policy, due to leakages in the form of imports, the multiplier in an open economy is lower than in a closed one.

What about monetary policy? If the central bank reduces interest rates, we have the well-known effects on private consumption and investment: consumer credits get cheeper and more investment-projects pass the rentability-test. In an open economy we have an additional effect: with flexible exchange rates (as we know, with fixed exchange rates there is no autonomous interest policy of the central-bank) lower domestic interest rates make domestic financial assets less attractive and capital

flows out. The demand for domestic currency is reduced, the exchange rate depreciates and thus raises net exports. This is a third channel with an expansionary effect on domestic GDP. The same reduction of the interest rates in an open economy has a larger effect on capacity utilization than in a closed economy. Graphically this means that the IS-curve is flatter.

This is the well-known Mundell (1961, 1963)-Flemming (1962) result: Under flexible exchange rates fiscal policy is less and monetary policy is more powerful in an open than in a closed economy.

The x-u relation is affected as soon as the exchange rate changes prices for goods (intermediate or raw materials) that are used in the production process. With rising prices for imported production-factors, either substitution has to take place or, if the processes are putty-clay, parts of the capital stock may become unprofitable to be employed and will leave the production process after some time. This means a reduction of capital-restricted potential output and a widening (or closing) of the gap between the two potentials. As we know this changes the slope of the x-u relation.

The Phillips Curve moves with changes in expectations and the NAIRU. Informed agents know that a depreciation results in rising import prices and more export demand. The first gives reason to expect rising prices and the latter to expect rising tensions on the goods-market (unless capacity utilization is well below unity). Qualitatively this is true. How large the effects will be quantitatively and how much the curve will move is a matter of the specific situation.

The position and slope of the TR curve is the result of the interpretation of the central bank policy. Open economy considerations are to enter that process of interpretation. Thus changes of the exchange rate may have some impact on the slope of the TR curve.

All these considerations and others that might be made as well show that in an open economy there are additional transmission channels and the positions and slopes of some curves are different compared to a closed economy. But none of the curves is altered in a way to make our framework obsolete. To plot the curves is a matter of the specific situation, i.e. the economy and the period of time.

III.2 Growth

What about growth? Suppose our economy was on the steady-state growth path. What would change in our framework? Nothing. All our variables are stationary. Interest rates, capacity utilization, unemployment rate and inflation rate: none of these variables changes on the steady state growth path.

What happens if the economy is not on the steady-state path - as in the real world it is usually? The IS curve represents short-run equilibria and is not affected by long-run disequilibria. The x-u relation is affected as soon as the two potentials differ, so long-run disequilibria are catched in the slope of the x-u relation.The Phillips Curve moves as soon as the inflation rate is long enough out of its steady-state value to change expectations or the NAIRU changes due to differences in the potential outputs.

All this can be taken into account in our framework. As simple as the graphics look, it offers a way to present the results of all models that cover the mostly-used concepts for stabilization policy in an easy-to-understand graph. It is not for quantitative analysis but for qualitative analysis. It compares different states of the economy. It is an instrument of analysis for the needs for stabilization policy. It can tell us what has to be done, but not how much, when and for how long.

IV. Concluding Remarks

In describing the overall situation of an economy our framework is an useable instrument to present the results of very different models in an even to non-economists seizable way. As the positions of the curves relative to their equilibrium positions elucidate the problems of the economy, it gives useful informations for stabilization policy, and it helps to give recommendations what contemporary is the „right" stabilization policy.

The analysis basically is short-term: the situation in a certain period of time is plotted and compared with a hypothetic equilibrium situation. Thus the method is comparative statics, but the ceteris paribus clause is tempered. As short-, medium- and long-term considerations are mixed up, the movements of the curves over time have to be taken into account, i.e. several exogenous variables change. As presented, it is not able to describe any dynamics.

This framework is not calibrated to one specific economy. Further research will apply the framework to specific economies and historical situations.

Summary

Successful stabilization policy not only needs effective instruments and reliable indicators but also an usable theoretical framework. Since the breakdown of the „consensus model vintage 1970“ (Tobin 1980), among economists there was no agreement on such a framework. Reality was seen too complex to be scetched in a handy model. This is still true to the recent convergence in macroeconomics (Woodford 2009). In contrast, this paper looks not for a well-defined model but offers an as-simple-as-possible, general presentation-framework for a wide range of models. The result is a combination of useful concepts for stabilization policy, that covers important parts of the economy in a graphical presentation. In it's core it is a combination of four graphs: the IS-LM graph, the x-u relation, the Phillips Curve and the Taylor Rule.

In the short-run this framework describes stabilization policy in the traditional Keynesian way. But if there is structural unemployment or economic agents do change their expectations on inflation (which result in shifts of the Phillips Curve) it displays that this short-run equlibrium causes or aggravates medium-term disequilibria. As all variables used on the axes are stationary, this presentation even covers a growing economy.

This framework uses the „golden age“ of short-run, medium-term and long-run equlibrium - the „never-never land“ - as reference. Thus the state of the economy can be scetched graphically in a comparative static way. It's usefulness is to show what has to change in what direction. But admittedly, it is too simple to describe the time-paths of changes - a task that is left to much more complicated and less generally understandable models or other theoretical or empirical frameworks.

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