Learning about Trends: Spending and Credit Fluctuations in Open Economies

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1. Introduction

This paper is inspired by an old theme. The view that misperceptions about the future outcomes of current plans can generate business fluctuations has a long tradition in the literature. Theories that allow for the existence of intertemporal coordination failures can have different specific features (cf. Leijonhufvud (1968), (1981)). They have in common the argument that agents decide on the basis

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of a less than perfect knowledge of the "laws of motion" of the environment, and that the consequent difficulties in forming expectations can have noticeable macroeconomic consequences. In particular, a class of cyclical ups and downs may emerge when agents cannot forecast accurately the characteristics of the economy's growth path.

Identifying growth trends is generally problematic. Still, when economies are evolving more or less smoothly, agents can rely on extrapolating past performance in order to predict future opportunities. This does not apply in the case of rapid transitions. Events such as policy or institutional reforms, shifts in external conditions, or technological changes can drastically alter the behavior of an economy, in ways that agents (and analysts) need not be able to anticipate precisely. Expected returns on investment, wealth perceptions and the anticipated profitability of lending would then vary as individuals revise their beliefs according to the information that they receive and the rules of inference that they use. The resulting dynamics of expectations translates into movements in aggregate spending and output.

This line of reasoning seems likely to be relevant to interpret some particular cyclical episodes. In the Latin American experience of the last decades, there

were a number of instances in which wide-ranging policies of stabilization and economic reform were associated with large fluctuations in domestic demand, relative prices and the trade balance, as an initial phase of rapid increase in aggregate spending was followed by a sharp contraction. Indeed, those cycles have been analyzed in different ways (some alternative arguments are briefly discussed in section 5). The conjecture that we explore in our work is that revisions of expectations (both on the part of domestic agents and foreign lenders) about the prospects of the economies play an important part in episodes of that type. In section 2 we present a brief description of some cases to motivate the analysis which follows; the preliminary evidence suggests that there was room for large movements in forecasts of output flows and, consequently, in wealth perceptions.

In section 3, which is based on Heymann and Sanguinetti (1996), we specify the basic argument through a simple model. We use an analytical framework with points in common with that of the literature on real business cycles for open economies in intertemporal equilibrium. The fluctuations that we represent are of a real nature, in the sense that they originate from a shift in real opportunities, and the behavior of the system is simulated without imposing restrictions on price adjustments. Current markets clear. However, we differ from the equilibrium

analysis in treating future income flows (and, therefore, wealth), as variables which agents must predict by using the knowledge they have obtained from some learning procedures that will not automatically reveal to them the actual features of the relevant processes.

In the model, the investment opportunities of an individual agent (and, in an extended version that incorporates non-traded goods, his sales prices) depend on aggregate output. Each agent must therefore form expectations about the aggregate performance of the economy in order to plan his capital accumulation and consumption. The purpose of the model is to analyze the response of the system to a "singular" real shock. Specifically, in the simulation exercises we consider the effects of a productivity shift that takes place in the current period; with slight changes, the analysis would apply also to "news" that would signal that such a shift will occur in the future. We want to represent agents who are alert to the properties of the environment, but who fall short of being all-knowing: the individuals in the model may recognize when there has been a change of fundamentals, but they do not have immediate access to the "true model" of the economy. Agents are assumed to base their expectations about aggregate production on an auto-regressive function whose form is similar to the

one which would (approximately) describe the convergence to the steady state along a perfect foresight path. Starting with some initial guess about the shape of the function, the agents update its parameters using a standard adaptive-learning algorithm (cf. Sargent (1993), Evans and Honkapohja (1995)).

For some initial configurations of the parameters, the model can generate transitional cycles in spending. The system eventually approaches a steady state, but the convergence may be non-monotonic. For example, if individuals initially overestimate their wealth (because they have exaggerated expectations about the growth in economy-wide output), their consumption will exceed the perfect foresight value. The error need not be corrected at once: the aggregation of individual actions can generate realizations of total output which, for a certain number of periods, are larger than individuals anticipated. This, in turn, would lead to an upward revision of wealth perceptions, that is, to a movement "in the wrong direction".

The agents in the model do make mistakes, but not "systematic" ones. The shock they are responding to is a unique event, and the learning procedure finally takes the system to a steady state where expectations are accurate. Moreover, as shown in section 3, for a given shock, certain sets of initial beliefs generate

sizable cycles, while others do not. Without a good knowledge of the structure of the model and without a good knowledge of aggregate expectations, an individual cannot easily infer that the system is following a cyclical path only by observing its behavior in a few periods. Agents could, indeed, realize that the system they inhabit is undergoing a transition, and that it may go through a period of "excessive" or "insufficient" expansion. However, the observable aggregate information does not provide a simple way to revise in one direction or the other the expectations derived from the learning algorithm. One could say that it is precisely the fact that agents may confuse non-equilibrium behavior for a movement along a well-coordinated path which sustains for some time the misperceptions that result in the spending cycles.

In the model just sketched, changes in spending are associated with movements in the demand for credit at an exogenously given interest rate. The argument serves to highlight the role of income expectations in the determination of aggregate demand and the trade balance in an open economy. However, it is clearly incomplete both from an analytical point of view and for the purpose of interpreting concrete episodes: swings in credit conditions are salient features of the fluctuations we are concerned with.

There is a sizeable recent literature that analyzes "credit cycles". This literature has stressed the links between the value of the assets held by prospective borrowers and their access to credit; changes in the tightness of financial restrictions generate a mechanism by which the effects of shocks are amplified and persist over time. We are interested in a related issue: how perceptions about the evolution of future income act on the supply and the demand of credit. In section 4 we analyze possible extensions of the basic model that endogenize the supply of credit and incorporate financial effects. Although the analysis is carried out within a very schematic framework (a standard two-period, two-state consumption-loan model allowing for default) and it is not fully integrated with the multi-period learning model of capital accumulation presented before, we can identify several channels through which expectations influence current expenditures, pointing to different cyclical scenarios. When lenders revise their expectations about the performances of the economy in "bad states" (when partial default will occur), the consequent shift in the supply of credit appears to "initiate" the upswing or downswing; the credit demand schedule varies with the forecasts of prospective borrowers of their income in "good states". This suggests that, depending on the conditions of each case, interest rates and aggregate demand can be related in different ways.

In section 4 we comment briefly on how the previous results could be of use in analyzing cyclical episodes. Interpretations based on alternative approaches are discussed in section 5, with reference to recent fluctuation in Latin America. In that section, we also deal briefly with policy implications; the point that we make is that, irrespective of whether policy-makers have "superior knowledge" about the behavior of the economies, their decisions are actually predicated on judgments, not only about the future evolution of fundamentals, but also about the way in which the private sector determines its own expectations.

2. A brief review of some episodes

The Latin American experience of the last decades offers a number of examples of very wide economic fluctuations. Several of them took place in the midst of major changes in economic policies. Such policy reforms aimed specifically at price stabilization, but they were also motivated by disappointment in the growth performance of the economies, and tried purposefully to modify the environment for private decisions. There is a vast literature analyzing these episodes; we rely on it in the brief discussion that follows. Clearly, we cannot try to present a full picture: this would require a detailed study of each case. The purpose of this

section is simply to provide a broad view of a set of cyclical episodes, indicating the nature of the changes the economies were undergoing, and suggesting that the observed performance may have been linked to significant revisions in agent's perceptions of the growth prospects of income.

Chile 1977-1982. Between 1970 and 1975, the Chilean economy contracted by an average of more than 2% a year, during a period of political turmoil. Large-scale economic reforms started in 1974, with the privatization of banks and public enterprises, followed soon later by measures that liberalized international trade: non-tariff barriers were eliminated, and the government announced a schedule of tariffs converging to a flat 10% rate in 1979. The removal of restrictions on financial transactions induced a large expansion in the banking sector. In 1975, the government implemented a large fiscal adjustment by cutting expenditures and raising taxes.

After a sharp recession in 1975, real output showed a rapid recovery, with growth over 7% in 1976-1978. In order to attack inflation, still very high (84% in 1977), in June 1978 the government decided to apply a policy of pre-announced devaluations at a declining rate, converging towards a peg to the dollar. Also, international financial movements were further liberalized. Other reforms launched

at this time were the introduction of a private pension system and various measures of deregulation in goods markets.

Real growth continued to be quite strong: again, over 7% on average in 1978-1981. Edwards and Cox-Edwards (1987) have stated: "...This new growth pattern together with the reduction of inflation ...generated a sense of prosperity and of improved future economic perspectives for the general public... This, in turn, resulted in a perception of substantially high wealth". Moreover, the large supply of funds in world markets stimulated lending to the region, and particularly to Chile. Such conditions were reflected in dramatic increases in asset prices and in private spending: the savings rate fell sharply. The consumption boom was asociated with a large current account deficit, which average 7% of GDP in 1978-1980, and reached near 19% in 1981. In addition, a large real appreciation was observed.

The expansion in output and aggregate demand started to slow down in 1981. Interest rates rose, and highly indebted firms showed difficulties in making repayments. This created problems for banks.

By the beginning of 1982, real output was declining, and the expectations of devaluation brought about a capital outflow. Around that time, financial flows to

the region were suddenly cut. A balance of payments crisis forced a devaluation in September 1982; in that year, real GDP fell by 14%, and by 0.7% the following year, before the long (and lasting) recovery that started in the mid-eighties.

Argentina 1978-1982. After more than a decade of moderate but sustained growth in real GDP, the Argentine economy went into recession in 1975, as the policies of high budget deficits and rapid monetary expansions then followed by the government led to a balance of payments crisis and to a succession of large devaluations. The drop in real incomes and the acceleration of inflation aggravated the political crisis. After the military takeover in March 1976, the government eliminated price controls and abolished the system of multiple exchange rates. Many restrictions on foreign exchange transactions were eliminated, and tariffs rates were reduced (although this mainly meant a reduction in redundant protection). Various changes were introduced in the tax system (e.g. the VAT was applied to a wider set of activities, and the income tax was reformulated). In June 1977, a financial reform liberalized interest rates.

Real output increased more than 6% in 1977 (with a sharp increase in investments, both private and public), but fell again the following year, probably as a result of tighter monetary conditions. The inflation rate was still much higher

than 100% a year. In December 1978, the government initiated a policy of pre-announced devaluations. This was combined with tariff reductions.

In 1979, domestic demand and real output increased fast; the inflation rate fell, but remained well above the rate of devaluation. There was a substantial revaluation in the dollar value of incomes[2]. At the same time, public spending kept rising. The higher expenditures of both the private and public sectors contributed to generate a sizeable current account deficit in 1980, despite the sharp increase in export prices.

Already in 1980, some domestic firms were making losses. Early in that year, bank failures induced a movement of funds away from deposits and into foreign currencies. The government was able to stop an incipient run on the banks, but the level of foreign reserves declined, while real output stagnated. Exchange rate speculation put pressure on interest rates. Capital flight became rapid at the

[2]The per capital GDP in dollar terms has shown very large movements (after correcting for US inflation): it reached almost 14000 dollars (in 1996 prices) in 1980, fell to 5700 dollars two years later, and was only 3500 at the end of the decade (during the hyperinflationary period); in 1994, it exceeded 8000 dollars. Of course, these figures simply result from applying the current exchange rates to the nominal value of GDP; they do not necessarily reflect "sustainable" levels of income. But this is precisely the problem that agents face in these fluctuations: they observe that their income has a certain purchasing power over traded goods (which can be quite different from what it was some time ago), and must decide whether it can be extrapolated into the future. The significance of the movements in "dollar incomes " (and, more generally, in wealth perceptions) in the context of Argentine cycles is analyzed in Heymann (1983, 1984). For a discussion of the late seventies/early eighties episode, see also Dornbusch and De Pablo (1989).

beginning of 1981. The exchange rate policy was eventually abandoned. The large depreciation of the currency in 1981 and 1982 aggravated the financial situation of firms and individuals with dollar debts. The contraction of GDP accumulated over those two years reached around 8%.

Uruguay 1978-1982. Since the mid seventies, the Uruguayan government had adopted policies of economic liberalization, by gradually eliminating price controls, doing away with the system of multiple exchanges rates, removing interest rate ceilings, reducing barriers to entry in banking, abolishing restrictions on capital flows and progressively lowering taxes on traditional exports. In 1975-1978, the annual growth of GDP accelerated to an average of 4%[3], with a marked increase in the investment ratio. In October 1978, the exchange rate was fixed. Together with this announcement, the government established a new schedule of tariff reductions. At the end of 1978, legal reserve requirements on bank liabilities were unified at 20%, and totally eliminated the following month of May. The fiscal deficit was already low (less than 1% of GDP); in any case, new measures to raise tax revenues were taken in 1979.

In 1978-1980, GDP growth (5.7% on average) improved upon the previous

[3]The trend rate for the two previous decades (1955-1974) has been estimated in 1% per year (Hanson and De Melo (1985)).

performance. Domestic demand rose sharply (more than 10% in 1979). As it happened in the other countries, there was a considerable real appreciation and a growing current account deficit[4]. However, in 1981, output growth was only around 1%, and domestic demand already contracted (cf. Talvi (1995)). This contraction became rapid in 1982 (when real GDP fell by 10%). Although lower real expenditures led to a reduction in the current account deficit, the demand for foreign currencies increased sharply, as the budget deficit soared (to nearly 9% of GDP, compared with 0.1% of GDP the previous year), and the public formed strong expectations of a devaluation in the near future. In fact, the devaluation occurred in November 1982, and was followed by further falls in output and severe difficulties in the financial system (Vaz (1997)).

Mexico 1987-1995. The Mexican stabilization plan which started at the end of 1987 was part of a comprehensive program of economics reforms that was initiated as a reaction to the 1982 foreign debt crisis. The measures taken in the 1983-1987 period were aimed at reducing the budget deficit and liberalizing foreign trade. Real growth was slow and unsteady. Despite the fiscal adjustment,

[4]It has been argued that wealth effects were significant during this period: "...The land and real estate boom led to the perception of a permanent increase in wealth". (Hanson and De Melo (1985)).

inflation remained high, and accelerated in 1986 when a fall in the price of oil led to a more rapid rate of depreciation of the currency.

The 1987 disinflation stategy included the pre-announcement of the exchange rate and measures aiming at synchronizing a deceleration of wages and prices (cf. Ortiz (1991), Santaella and Vela (1995)). In addition, the government took new actions to cut the fiscal deficit and quickened the pace of reforms, especially in the areas of privatizations and trade liberalization (import tariffs were reduced, to a maximum of 20%, ahead of schedule). Inflation fell down. The real recovery was weak at first, then took speed between 1989 and 1991, with an average GDP growth of 4%. Observers of the Mexican economy pointed out that this performance was influenced by the success of disinflation, the economic reforms, the renegotiation of the foreign debt in 1989 and the prospects of trade integration within NAFTA (cf. Ortiz (1991)). Higher rates of output growth went together with still more rapid increases in domestic expenditures; this was associated with a real appreciation and larger current account deficits.

Economic activity decelerated in 1992 and 1993 (with increases in GDP of 2.8% and 0.4%, respectively). Santaella and Vela (1995) mention that concerns about the approval of NAFTA negatively affected expectations in 1992. In any case, the

current account deficit exceeded 7% of GDP in 1993. Relatively high interest rates and slow sales had an impact on the cash-flow of firms, with repercussions on the financial system. State development banks expanded their credit to commercial banks and to private firms in 1994. Real output rose by around 3%. However, in addition to the weakening of the economy's performance, the rise in US interest rates and internal political events increased the program's fragility. Diminishing foreign reserves induced the new administration that took office by the end of 1994 to let the currency depreciate. In 1995, GDP fell 6%. The sharp recession and the real depreciation caused widespread problems in the repayment of debts to the banks. Still, output recovered in 1996, led by a rapid increase in exports.

Argentina 1991-1995. Following a period of extreme monetary instability in 1989 and the early part of 1990, in 1991, the government passed a law fixing the exchange rate to the dollar and requiring the issue of base money to be tightly linked to foreign reserve flows. In the course of the early nineties, the authorities privatized most State enterprises. The government tended to concentrate its revenues on broad-base taxes, particularly the VAT. Import tariffs were reduced, and harmonized with those of neighboring countries in the context of the Mercosur agreements, which established free trade conditions within the area. In addition, a

private pensions system was introduced, and various activities were de-regulated. In 1993, the authorities completed a Brady-plan agreement with foreign creditors. Interest rate spreads measuring "country risk " premia decreased substantially.

The inflation rate converged to very low figures (less than 4% a year in 1994); in the process, however, domestic prices rose substantially relative to the exchange rate. Real output showed a very strong recovery. In the 1991-1994 period, GDP increased at an annual average of nearly 9%. Real consumption rose even faster, with an average rate of 10% a year. The investment rate grew, starting from very low levels. The rapid increase in domestic spending was financed by large capital inflows. In 1990, the trade balance had had an 8 billion dollar surplus (equivalent to around two-thirds of the value of exports); the deficit in 1994 approached 6 billion (36% of exports that year).

The rise in US interest rates in 1994 had some effects on domestic financial markets. By the middle of that year, there were some indications that the growth in domestic demand was levelling off; in contrast, exports (especially those going to Brazil) accelerated their growth. At any rate, following the Mexican devaluation at the end of 1994, the demand for domestic assets suddenly fell. The Central Bank lost reserves, and the volume of bank deposits declined; withdrawals

accelerated to a near panic by March 1995. The government maintained the convertibility system with a fixed exchange rate and negotiated loans from the IMF and other multilateral organizations. The banking panic stopped. However, there was a sharp credit contraction. The economy went into a recession: GDP fell 4.5% in 1995 and the unemployment rate (which had been rising even during the expansion) jumped to a peak of more than 18%. Larger exports and reduced imports resulted in a trade surplus. The demand for financial assets recovered since mid-1995. The cycle of real output reached a trough in the second half of this year. Activity increased in 1996 and 1997, although the unemployment rate remained very high.

The barebones description of these episodes shows that each one had specific features, both in terms of the process leading to the crisis and the behaviour of the economies after this had happened. However, the various cases also show important common aspects. The literature has focused mainly on the consequences of exchange rate pegging and the influence of international credit conditions (cf. for example, Kiguel and Liviatan (1992), Calvo and Vegh (1993), Calvo et al. (1993), Reinhart and Vegh (1995)). Clearly, these elements cannot be left out in a full analysis of the episodes. Still elementary calculations show that changes

in projected growth rates and in the terms of borrowing can lead to substantial movements in individuals' perceived wealth. Now, in all these episodes, at some point agents had reasons to believe that their incomes would grow at a faster rate than in the past, while foreign lenders were willing to provide financing, probably on the basis of optimistic evaluations of the economies' prospects. In the aftermath of crises, it seems likely that at least some of these expectations were disappointed. In the next sections we present some simple models with the objective of making the argument more precise.

3. A simple model

We consider first an open economy producing a single good, which faces a perfectly elastic supply/demand of foreign credit at an interest rate that equals the rate of time preference of the representative individual. The model is specified in a very standard fashion. The economy is populated by infinitely-lived individuals who produce the good, which can be consumed, sold abroad or "planted "as capital. The preferences of the representative agent are assumed to be time-separable, and

the individuals are supposed to decide as if they had perfect foresight.[5]

$$U_{it} = \sum_{j=t}^{\infty} \beta^{j-t} U_i({}_t c_{ij}) \tag{1}$$

The specification of preferences is such that the individual will choose a path with constant consumption. Therefore, ${}_t c_{ij}$, the planned consumption in period j chosen by individual i in period t, will be equal to the return on perceived wealth[6]:

$${}_t c_{ij} = {}_t[W_{it}^i](1-\beta) = \frac{r}{1+r}\,{}_t[W_{it}^i] \quad , \; j = t, t+1, .. \tag{2}$$

It is well known that consumption according to (2) implies that the individual plans to maintain a constant level of wealth (see Obstfeld and Rogoff (1994)).

Each individual produces the good using capital and a fixed input (e.g. specific labor). We assume that there are externalities in production, so that the output of a given individual varies positively with the aggregate level of output[7]. Production

[5]This simplification implies that the analysis leaves aside precautionary savings behavior, and flexibility preference effects. In the initial stages of a transition, it is likely that agents will recognize that their forecasts are uncertain, and will therefore choose to delay commitments until they can form more reliable expectations. For the sake of simplicity, we concentrate here on how agents may make "point projections "of their future income, and on the effects of such projections on market behavior.

[6]In expression (2) $({}_t W_{it}^i)$ indicates the level of wealth of individual i in period t, as perceived by that individual in that period; r denotes the interest rate.

[7]We use this formulation as a straightforward way to represent the (commonsense) assump-

also depends on a shift variable. We will interpret this variable as influenced by economic policies and also by other shocks. The production function is then specified as (with y_{it} being the output of individual i in period t, z_{it} the shift parameter, k_{it-1} the beginning of the period capital stock held by individual i in period t, and y_t aggregate output):

$$y_{it} = z_{it} \overset{\alpha}{k}_{it-1} y_t^{\eta} \tag{3}$$

As usually done in the literature, we suppose that changes in the capital stock have associated adjustment costs. For simplicity, these are taken to be a symmetric (quadratic) function of the gradient of the capital stock during the period. The productive decisions of the individual are governed by the objective of maximizing the present value of net output. This results in the following problem:

$$\max \sum_{j=t}^{\infty} \beta^{j-t} \left[{}_t y_{ij} - ({}_t k_{ij} - {}_t k_{ij-1}) - \frac{\phi}{2} \frac{({}_t k_{ij} - {}_t k_{ij-1})^2}{{}_t k_{ij-1}} \right] = {}_t[W_{it}^{iy}] \tag{4}$$

Here ${}_t y_{ij}$ denotes the level of individual output in period j planned at t by agent

tion that the opportunities of a given agent depend on the aggregate performance of the economy. The influence of total output on individual production may derive from technology or from other effects such as "thick market" externalities (cf. Howitt and McAffee (1992)).

i (and similarly for ${}_tk_{ij}$), ${}_t[W_{it}^{iy}]$ indicates the expected present value, perceived by individual i, of his production plan (net of investment and adjustment costs) defined at t.

Due to the externality, the path for the capital stock, the value of perceived wealth and consumption will depend on the expectations that the individual forms about aggregate output. Given the accumulation and production plan derived from the programming problem (4), and given those expectations, the individual estimates the present value of the planned flow of output, net of investment and adjustment costs. Perceived wealth equals that value of net output, less the agent's financial liabilities:

$$ {}_t[W_{it}^{i}] =_t [W_{it}^{iy}] - (1+r)b_{it-1} \tag{5}$$

We assume that initially (at $t = 0$), those liabilities are zero; thereafter, the realized level of debt evolves according to the difference between actual spending and output:

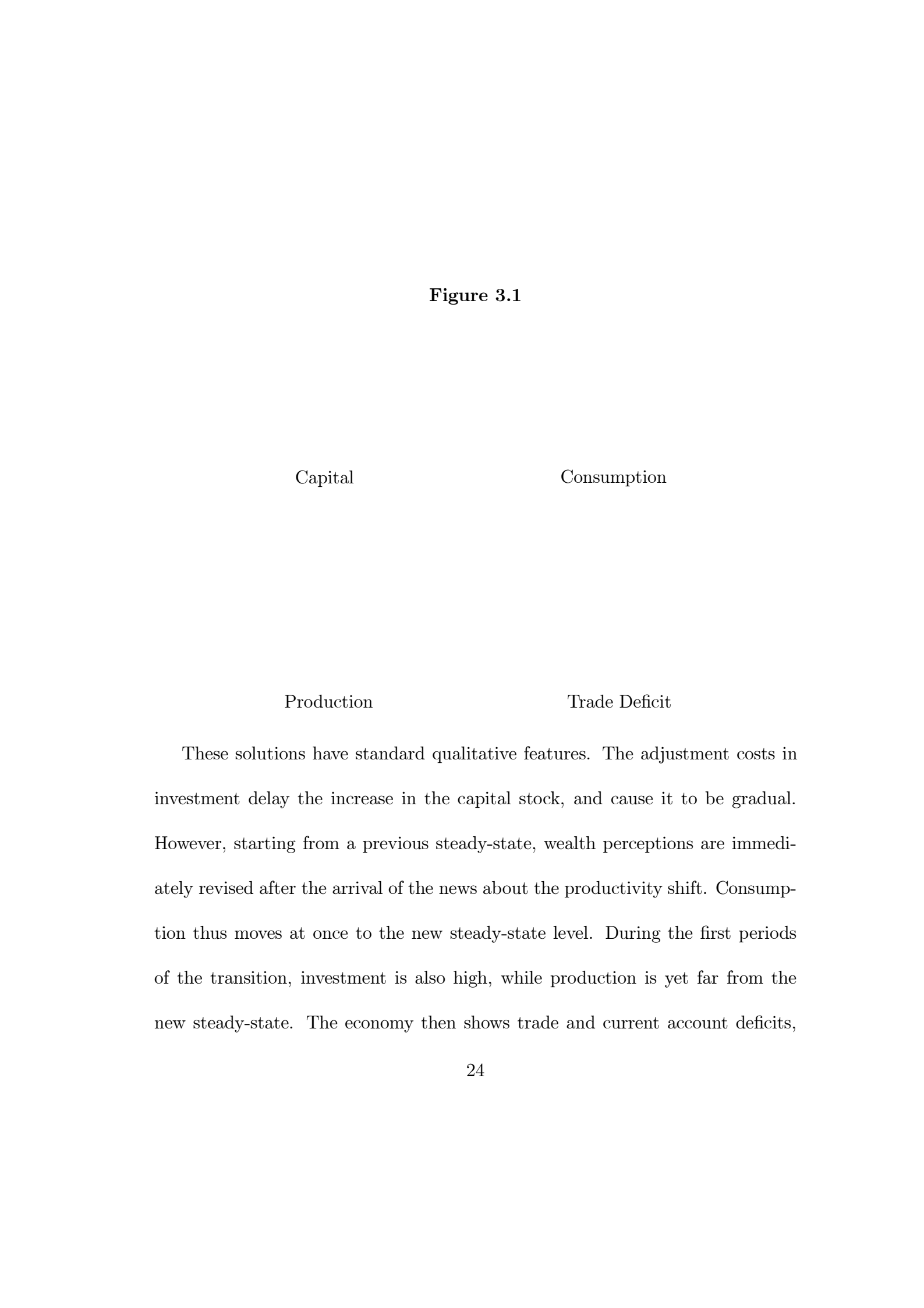
$$b_{it} = b_{it-1}(1+r) + c_{it} + (k_{it} - k_{it-1}) + \frac{\phi}{2}\frac{(k_{it} - k_{it-1})^2}{k_{it-1}} - y_{it} \tag{6}$$

The system defined by expressions (2)-(6) determines the production, consumption and financing plans of the individual for a given set of expectations. Assuming that z_{it} is a deterministic variable, a perfect foresight solution can be obtained by making anticipated future aggregate output equal to the value that the model delivers for each period. We have assumed that the externality in production is not too strong (i.e. $(\alpha + \eta) < 1$), so that the perfect foresight paths for output and the capital stock converge to a steady-state. [8]

Figure 3.1 shows the simulated paths of the main variables after an upward (permanent) productivity shift which raises steady-state output by 15%.

[8] We have used this property to solve the optimization problem (2)-(6). The first order conditions for this problem define a non-linear difference equation. We obtained approximate solutions numerically as the roots of a system of equations, assuming that the steady state is reached after 40 steps.

Figure 3.1



These solutions have standard qualitative features. The adjustment costs in investment delay the increase in the capital stock, and cause it to be gradual. However, starting from a previous steady-state, wealth perceptions are immediately revised after the arrival of the news about the productivity shift. Consumption thus moves at once to the new steady-state level. During the first periods of the transition, investment is also high, while production is yet far from the new steady-state. The economy then shows trade and current account deficits,

as foreign credit is used to finance the higher level of spending. After its initial jump, aggregate expenditure falls during the transition path (due to the gradual decrease in investment), while output increases. Eventually, the trade balance becomes positive. As the economy approaches the steady-state, the trade surplus becomes close to the value of the interest services on the accumulated debt. Wealth remains constant after being re-evaluated when the shock is observed; as should be the case along a perfect foresight path, this validates the expectations that sustained the initial increase in consumption.

In this perfect foresight case, changes in output near the steady state can be approximated by a first-order autoregressive equation:

$$y_t = \lambda y_{t-1} + (1 - \lambda)\overline{y} = \lambda y_{t-1} + y^* \tag{7}$$

According to expression (7), the value of aggregate output in a given period is a convex combination of its observed value in the previous period and of the steady-state output $\overline{y}$. The parameter λ is a measure of the speed of the transition: if it is small, the autoregressive term is also small, and consequently output converges fast to its steady state.

Although the perfect foresight evolution of the hypothetical economy is qualitatively simple, the numerical results depend on the values of various parameters, which need not be known by all the agents. From the point of view of an individual trying to anticipate the future behavior of output for the purpose of drawing his own plans, finding out the path generated by the fundamentals of this simple model of the economy would imply knowing the aggregate shock, the strength of the externality effect and the adjustment costs of investment for the average firm (in order to predict the rate of investment of other agents). These parameters are likely to be difficult to specify, particularly if the economy is going through a structural change, in which the coefficients of can be supposed to be shifting.

The scenario we are interested in analyzing is one where agents realize that there has been a productivity shock (both for their own specific activity and for the economy as a whole), and they are able to determine in broad terms how the system will react, but they must learn about the quantitative performance of the economy through some type of learning procedure.

For the purposes of this exercise, we use a relatively simple adaptive algorithm to model the way in which individuals update their expectations of the aggregate output of traded goods. This learning scheme seems reasonably well adapted

to the case we are studying. As we showed before, the perfect foresight model generates a solution with a gradual relaxation of output towards the steady- state. This solution is approximated by expression (7). We assume that agents form their expectations on the basis of this equation which implies that they can identify the general form of the equilibrium output path: even if they do not try to consider the way in which fundamentals and expectations interact to generate output, they employ a reduced form approach which is appropriate for the problem they are facing. Agents use the observations of actual aggregate output to revise their estimates of the parameters y^* and λ. In period 0, when they receive information about the occurrence of the productivity shock, individuals make a conjecture about the values of these parameters. Those conjectures could in practice be based on the history of the economy itself, on similar episodes of other economies, or upon "influential opinions". In this exercise, we take the initial conjectures as given.

A commonly used learning scheme is based on the stochastic approximation algorithm (cf. Sargent (1993), Evans and Honkapohja (1995)). According to this scheme, the parameters of a linear function relating a variable y with a vector of variables x are to be determined by:

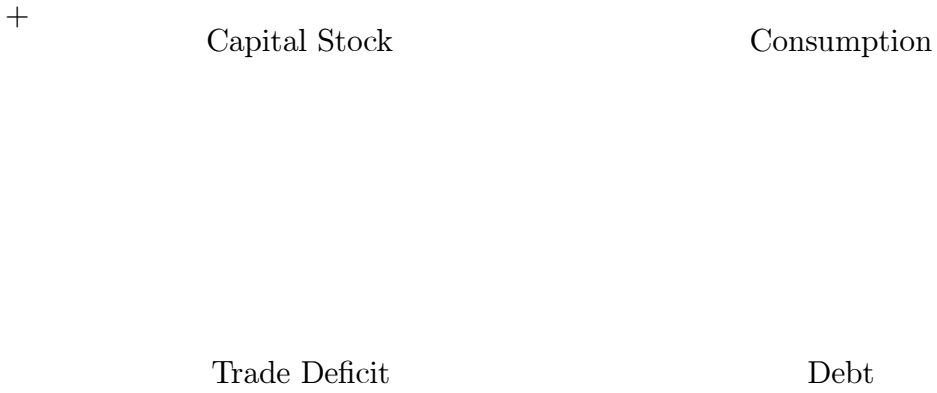
$$\begin{aligned} \beta_t &= \beta_{t-1} + \gamma_t R_t^{-1} x_t (y_t - x_t^{'} \beta_{t-1}) \\ R_t &= R_{t-1} + \gamma_t (x_t x_t^{'} - R_{t-1}) \end{aligned} \tag{8}$$

The coefficient γ_t can be a function of time. When γ_t diminishes with t (a decreasing gain algorithm), this means that successive forecast errors have less weight in determining the parameters. In a recursive regression,γ_t =$1/t$. The constant gain algorithms result by setting the parameter γ_t at a given, fixed value. Such algorithms will find use when it is believed that the process generating the variable y is subject to frequent changes (cf. Evans and Honkapohja (1993)). In our case, the agent must learn about the values of y^* and λ of equation (7), so that the vector β_t includes both parameters. The learning procedure implies that the agent uses the forecast errors that he makes over time to recompute the estimates of the coefficients on which he bases the expectations of future aggregate output of the good . In particular, if the individual has underpredicted total production this period, he will revise upwards his estimate of long-run aggregate output. The intuition seems clear: the agent interprets the event of a higher-than-expected output as an indication that production will converge to a higher value than he

had previously anticipated.

The model can be used to simulate different scenarios depending on the initial conjectures of the representative agent. In Figure 3.2 we show the results for the case in which the agent starts with the belief that the output of traded goods will eventually rise 10% above the value that the model generates for the new perfect foresight steady state, and where the initially expected speed of convergence is given by a parameter $\lambda = .95$, instead of the value (near 0.83) that approximates the behavior along the perfect foresight path. These parameters are updated with a constant gain algorithm. In order to allow a comparison to be made, the graphs show the results both with learning and with perfect foresight. It can be observed that there is indeed convergence to a steady-state, and that the values of the capital stock and aggregate output tend to those that would apply under perfect foresight. Still, in the transition, the model with learning generates a cycle in consumption and a movement in the trade balance which differs noticeably from the perfect foresight path.

Figure 3.2



The simulation suggests that learning about the long-run trend using a "reasonable "procedure can generate fluctuations in consumption (which would not be observed under perfect foresight) and may cause the trade balance to stay away for some time from a "sustainable "path. In the model, the mistakes which are made in the transition have "long-run "consequences, since they become embodied in the level of the foreign debt. One point to be stressed is that the estimates

of wealth (and, therefore, consumption) follow a non-monotonic movement. This implies that the original misperceptions are not corrected at once, but may get amplified for a certain time interval. The reason is that the agent, while being over-optimistic (in this case) about the present value of output, makes "conservative" (and relatively accurate) one-step ahead projections; in other words, the short-run behavior that he observes more than confirms his exaggerated perceptions of the future trend, until eventually the error is revealed.

This non-monotonicity can arise with other configurations of the initial parameters, but not all[9]. If the agent starts with a too-low estimate of $\overline{y}$, and initially predicts a too-slow convergence to the new steady state, wealth perceptions are of course over-pessimistic, and the individual will initially underpredict actual growth. This will lead to a revision of the parameters. If the corrections in the value of λ are relatively slow, it is possible that at some point wealth perceptions overshoot the sustainable value. In this case, there will be a "delayed boom", which will in turn lead to a downward correction of consumption in the future; here again, the path is non-monotonic. If, instead, the agent initially expects a

[9]It may be noted that, if one makes the learning start with a set of parameters such that the final level of output and the speed of convergence match with those of the actual perfect foresight path, this path is almost exactly reproduced under iterations of the learning model: sucessive observations validate the initial parameters. That means that the learning algorithm applied to the function specified in equation (7) does not "generate errors by itself".

very rapid movement to an excessively high level of output, experience will rapidly tell him that his forecasts were biased: the convergence path of consumption would be monotonic from above. There are other cases (e.g. with an initial $\overline{y}$ set at a too-slow level and a high λ), where consumption shows a smooth convergence from below.

There is, therefore, a multiplicity of possible behaviours depending on the parameters with which the learning starts. We do not consider this multiplicity as a weakness of the analysis. On the contrary, it makes misperceptions more plausible, if it is assumed that agents not only learn from observing actual data, but that they can, at least qualitatively, realize that the trajectory of the economy is itself influenced by learning processes. Suppose that the model generated a definite prediction of intertemporal disequilibrium irrespective of initial beliefs; say, its results showed that there would always be an initial boom and a future adjustment. Then, one could clearly object that "smart "agents should realize that they (and their neighbors) are overspending, which should induce a revision of plans. In this model, the situation is not so simple, implying that there is no easily identifiable way to revise (what will eventualy turn out to be) a misperception.

In any case, the model can be extended without too much difficulty to in-

corporate non-traded goods. In Heymann and Sanguinetti (1996), it is assumed that good N (non-traded) is produced with traded inputs (and a Cobb-Douglas production function), while good T does not use N as a factor. This, in fact, "decouples" the system: the production decisions of good T can be represented as in a one-good model. In addition, preferences are specified in a such a way that the share of each good in consumption expenditures is a constant. Therefore, with these simplifying hypotheses, in intertemporal equilibrium, total wealth is a (constant) multiple of "traded goods wealth", defined as the present value of traded-goods output, net of investment and the pre-existing foreign debt.

In such a system, during a transition (due to, say, a shock in the productivity parameter z), agents have to learn about the future value of traded-goods output for two reasons: to estimate their own future productivity (if there is an externality) and to estimate the future proceeds from the sale of non-traded output. We assume that agents are aware of this link between aggregate demand, the relative price of non-tradables and "traded goods wealth". Consequently, the learning procedure that we sketched in this section for the one-good model is a central element of the scheme that generates wealth perceptions (and therefore, consumption decisions) in the framework with two goods.

In the two-goods setting, spending on non-traded goods is a function of perceived wealth; production of good N and the relative price of this good (i.e. the inverse of the real exchange rate) would move together with the changes in W. Consumption cycles would then be associated with fluctuations in the real exchange rate and the production of non-tradables. Expectations biased towards pessimism (to change the example) would be associated with an "excessively high" real exchange rate and a too-low production in non-traded-goods sectors.

4. Notes on Credit fluctuations

The analysis of the previous section has concentrated on the expectations and decisions of producers-consumers. The credit market was represented simply through the exogenous interest rate, at which every agent could lend or borrow without restrictions. In the model, debts were always repaid in full, and market participants planned on the basis of that assumption. The interest rate varied only with "world conditions" (kept under the ceteris paribus assumption), independently of the behaviour of the economy to be modelled. Thus, the volume of lending accommodated "passively" the shifts in demand, and the state of expectations had no effect on the terms on which credit was supplied. Frustrated expectations led

agents to revise their plans and, therefore, brought about unforeseen adjustments in spending, but they did not cause any specific disturbance in financial markets.

No doubt, that representation left out of the analysis important features of business fluctuations. The behavior of credit markets is especially relevant for the type of cycles we are trying to study, which are driven by changing perceptions about the future performance of the economy: the expectations of lenders and the consequent movements in credit conditions clearly should matter in determining the movements in aggregate demand. More specifically, in the episodes mentioned in section 2, one of the most prominent elements was the "easing" of credit terms during the expansions (or, at least, during a good part of these phases), while contractions were associated with abrupt credit crunches and, sometimes, with big disturbances in financial markets.

Interest in modelling "credit cycles" has revived in recent years[10]. This has placed once more in focus the interaction between real activity and financial conditions. When debtors may default on their obligations, changes in the size of

[10]See, for example, Bernanke and Gertler (1989), Greenwald and Stiglitz (1993), Lamont (1995), Kiyotaki and Moore (1997). The traditional literature on the cyclical behavior of credit markets is vast and extremely varied (themes from this literature are re-considered from different perspectives in Leijonhufvud (1968), Minsky (1975)). The argument (common to the several lines of analysis despite their wide differences) that financial fluctuations (and, a fortiori, "financial crises") originate from biases or inconsistencies in expectations separates that traditional body of literature from much of the recent one.

collaterals and current cash-flows influence the ability of agents to finance spending and production. In this connection, we want to emphasize two simple points. First, credit terms depend on the anticipated magnitude of the future income of borrowers (or, which is equivalent for these purposes, the expected value of collaterals). Thus, the supply of credit will be predicated on the beliefs of potential lenders regarding the evolution of income; such beliefs are derived from the learning performed by the agents. Second, lenders are particularly concerned about their debtor's income in "bad states" (in which they default), while borrowers determine their demand for credit looking at expected income in the "no-default" region; this asymmetry has potential consequences for the link between interest rates and real activity.

A well developed analysis of credit and real markets would require bringing together the analysis of intertemporal choices on production, consumption, borrowing and lending over a more or less long horizon. This appears quite complicated. For that reason, at this point we will use a very simple framework, which is not fully integrated with the one presented in the previous section, but that is useful anyway to illustrate on the connections between output expectations, the supply of credit and the volume of spending.

The setup is quite standard (cf. Jaffee and Stiglitz (1990), Hodgman (1960)). We follow usual practice in restricting the horizon to two periods. Given the aim of the exercise, it will be enough to consider a consumption loan model[11]. The demand for credit is generated by individuals endowed with exogenous flows of the single good in each period[12]. Output in period 1 is perfectly observed before decisions are taken, while future output is not known with certainty. Therefore, lenders and borrowers must make conjectures about output in period 2. Both parts of a credit transaction may differ regarding the probability distribution that they assume for the future income of the borrower[13]. However, once realized, the income of every individual in period 2 becomes public information[14]. We also suppose that the economy is small, and faces a parametric "riskless interest rate" determined abroad.

Financial assets consist of bonds with a fixed interest rate in terms of the single

[11]Our main purpose here is to study credit conditions faced by private agents. We assume that loan contracts can be enforced (provided the borrower has enough resources to fulfill his obligations). We leave aside the particular problems associated with "sovereign debt".

[12]The exercise starts with no outstanding debt. It would be simple to include a pre-determined amount of "inherited" assets (liabilities) due in period 1: in this case, for the purpose of determining the size of borrowing in period 1, the analog for period 1 "income" would be the flow endowment plus (minus) the value of those assets (liabilities).

[13]The possibility of different conjectures includes as a special case that of asymmetric information, but is not restricted to that case, since agents need not interpret equally the same set of data.

[14]This rules out, for the sake of simplicity, the existence of monitoring costs and, hence, of agency problemas as in Bernanke and Gertler (1989).

good. If there are different types of borrowers distinguished by some observable features, financial contracts can be written so as to discriminate between the types. We do not allow the existence of assets explicitly contingent on the borrower's income. However, in the case on which we will concentrate the analysis –two possible values for future income, one in which there is default– the "escape clause" of the contract operates like a contingency provision.

We suppose that there is a mass of risk-neutral potential lenders, so that for every loan contract the expected return equals the riskless "world" return. Repayment of the loan takes place as follows. The consumption level of a borrower in period 2 cannot fall below a minimum value, $\underline{c}$. If actual income net of minimum consumption exceeds the contractual amount to be repaid, the lender receives the full value of the contract. Otherwise, the lender can appropriate the whole of income net of minimum consumption (that is, partial default is allowed).

We consider the case in which there are two states ("good" and "bad") in period 2; in the good state output is $\overline{y}$, and $\underline{y}$ in the bad state. Let p be the probability of the good state; b is the size of a loan made in period 1, r the contractual interest rate and r^* the world interest rate. At this point, we will assume that (from the point of view of the lender), p, $\underline{y}$, and $\overline{y}$ are independent

of r . If there are different types of borrowers, they are assumed to be perfectly distinguishable, so that there are no adverse selection effects a la Stiglitz and Weiss (1981).

The lender must expect a net return equal to the world interest rate. There are three regions. In the first one, the amount borrowed is sufficiently small so that there is full repayment even in the bad state. This is true if $\underline{y}-\underline{c} > b(1+r^*)$. Then the interest rate is simply r^*, because there is no default risk (if the borrower is assimilated to the country, there is zero spread due to "country risk"). When the size of the loan exceeds the limit stated above, there is (partial default) in the bad state, and the interest rate rises with the amount borrowed, to account for that hazard. There is an upper limit $\overline{b}$ such that, if $b > \overline{b}$, $b(1+r^*)$ is larger than the expected income of the borrower net of minimum consumption. Then, at no interest rate can the lender anticipate to recover the opportunity cost of funds. Therefore, lending is restricted so that it will not exceed $\overline{b}$. The arbitrage conditions then imply:

$$
\begin{aligned}
& r = r^* && 9a \quad if\ b(1+r^*) < \underline{y}^l - \underline{c} \\
& b(1+r^*) = p^l b(1+r) + (1-p^l)(\underline{y}^l - \underline{c}) && 9b \quad if\ \underline{y}^l - \underline{c} \leq b(1+r^*) \leq \overline{b}(1+r^*) \\
& \overline{b}(1+r^*) = p^l(\overline{y}^l - \underline{c}) + (1-p^l)(\underline{y}^l - \underline{c}) && 9c
\end{aligned}
\tag{9}
$$

Those equations determine the supply schedule for loans of a given "type" (i.e. for given attributes of the borrower as perceived by the lender). In the previous expression, the supra-indices attached to some variables indicate that they represent expectations formed by the lender. It is easy to see, but still worthy of notice, that the arbitrage conditions (9) generate a supply of funds schedule which is independent of the value of income in the "good state", when borrowing is not restricted. The value of $\overline{y}$ (as perceived by the lenders) does have an effect on the supply of loans, by changing the size of the credit limit $\overline{b}$, but it has no influence on the supply schedule below $\overline{b}$. Inside the region, in which there is a chance of default, credit conditions (determined by the interest rate for a given loan size) only depend on the perceptions that lenders have about the income in the bad state: an improvement (say) in the expectations that lenders have of the "worst case scenario" may lead to a sharp fall in the relevant interest

rate even though agents have not revised by much their forecast of future income for the case in which the economy "performs well".

We consider now the problem of the individual consumer. This individual faces the interest rate, r, corresponding to his "risk type". In order to concentrate on the cases more relevant to the macroeconomic problems we are concerned with, we will assume that current income is sufficiently low so that the individual plans to be a borrower, and that his demand for loans is such that he would default on his debts in the event the bad state occurred in period 2 (implying that consumption in that state would be $\underline{c}$, independently of the amount borrowed), but he would repay the loan in full in the good state. Then, the consumer maximizes expected utility, which is given by:

$$EU^i = u(y_1 + b) + \beta p^i u(\overline{y}^i - b(1+r)) + \beta(1-p^i)u(\underline{c}) \tag{10}$$

That implies:

$$u'(y_1 + b) - \beta p^i (1+r) u'(\overline{y}^i - b(1+r)) = 0 \tag{11}$$

Given that consumption in the bad state is fixed, as long as the consumer

stays in the region where there is default in such state, the demand for credit is independent of $\underline{y}$. By contrast, borrowing depends on $\overline{y}$. This result has a correspondence with the one obtained for the supply of funds: if there is a given probability of default, the supply of credit depends on the level of income in the bad state, as seen by lenders, while the demand schedule varies with the perception that borrowers have of the value of income in the good state. On the other hand, it is clear that the demand for credit depends negatively on the probability of the good state (keeping the interest rate constant), since a higher p increases the expected repayment[15].

The supply and demand schedules derived from equations (9) and (11) imply the following responses of market outcomes to changes in the variables considered

[15]It may be interesting to note that, if the instantaneous utility is logarithmic, consumption in period 1 would be given by:

$$y_1 + b = c_1 = \frac{1}{1+\beta p^i}(y_1 + \frac{\overline{y}^i}{1+r}) \tag{12}$$

The expression is analogous to that which applies under perfect foresight: consumption is proportional to a measure of wealth, with a coefficient which depends on the rate of time preference. Here, "wealth" is defined in such a way that the present value of future income would be represented by income in the good state, discounted at the quoted interest rate. The intuition is that, given that the agent has chosen to borrow in the range in which there is default in period 2 if the bad state occurs, he effectively "does not own", his income in that state (consumption will be $\underline{c}$ irrespective of $\underline{y}$); in the good state, the relevant interest rate is r, because the debt will be wholly repaid. Also, it can be seen that the probability of the good state operates like a variable that shifts the rate of time preference: the agent acts as if the "rate of impatience" was higher the lower is p^i.

as exogenous in this exercise:

* Naturally, an increase in current income (keeping expectations fixed) lowers the demand for credit. This results in a fall in the amount borrowed and a lower interest rate. If the increase in y_1 is sufficiently large, it can eliminate the default risk.

* A higher value of $\underline{y}$ (perceived by lenders) increases the volume of credit, by lowering the interest rate.

* An increase in $\overline{y}$ (anticipated by borrowers) also increases the volume of loans, but causes the interest rate to rise. This result, together with the previous one, indicate that, while optimism about income prospects has a positive effect on consumption and borrowing, the behavior of interest rates can be quite different depending on the perceptions of agents on both sides of the credit market, and according to whether the change in expectations refers to an increase in the income to be generated if "things go wrong" or to the outcome if "all goes well".

* A higher probability of the good state raises the supply of credit (and enlarges the credit limit) and reduces the demand at a given interest rate. The interest rate falls.

* A lower world interest rate clearly reduces the quoted rate and raises the

volume of credit.

This very simple analysis can be extended in several ways. One of them would be to allow for the existence of asymmetric information about the probability distribution of individual incomes, in such a way that some agents face credit rationing. Lifting the assumption that the time horizon is only two periods long would open up several interesting possiblities, by incorporating the possibility of "flexibility preference" effects, and by making the current decisions of borrowers depend on their forecasts of the future supply of credit. Also, there is no doubt that limiting the analysis to consumption loans is much too restrictive. Clearly, changes in credit conditions are transmitted to a large extent through the financing of investment and production; these effects make output depend directly on the expectations of lenders (cf. Agénor and Aizenman (1997), Kaufman (1996)).

At any rate, the results shown so far, elementary as they are, can be used to analyze some financial mechanisms in the context of business fluctuations. The channels through which expectations act on current spending will generally depend on how individuals perceive the probability distribution of future incomes. Although (for a given "world interest rate") forecasts about the future wealth of borrowers determine both the supply and the demand for credit, there are

conditions in which the "financial sector" would appear to initiate a movement in spending, and cases where movements in the volume of lending would seem to respond to shifts in borrowers' attitudes. Changes in expectations about the level of income to be obtained in a "bad" economic state would transmit their effects mainly through the supply of credit: the decisions of financial asset holders would then play an "active role" in the determination of aggregate expenditure.[16]

This channel may be particularly significant, for example, in economies which stabilize after undergoing extreme instability: it seems likely that agents would remain at first quite uncertain about growth prospects, but change their perception of the "worst case" scenario as economic conditions improve. Then, the first reaction to be observed would be a sharp easing of the terms of credit, to which spending would respond[17]. The rise in domestic expenditures would mainly come

[16]Our discussion here has dealt with credit markets without considering financial intermediaries. This is clearly an important omission. McKinnon and Pill (1994) discuss an "overborrowing syndrome" focusing on the expectations formed by banks. In that paper, intermediaries can make exact predictions, while the public misreads the economy's signals by attributing an increase in the willingness to lend by banks to an improvement in fundamentals rather than correctly interpreting that the banks respond to a malincentive generated by deposit guarantees. In our analysis, there need not be an asymmetry in the capacity to make forecasts.

[17]The shift in the supply of credit would be manifested in lower interest rates for given risk types and, probably also, in the inclusion as potential borrowers of agents which were previously "redlined". It may be noted that, if this last effect is important, there can be an increase in the observed rate of default, a rise in the measures of interest rate differentials among different groups of borrowers and perhaps even an increase in the average level of quoted interest rates, although the overall credit risk in the economy has shrunk, since presumably borrowers who were rationed out of the market will now access to loans at comparatively high interest rates

from an induced effect of the expansion in credit supply. If later on the economy starts showing signs of a stronger trend in output, expectations about growth in the good state would be revised, leading to a rise in credit demand at given interest rates. In those circumstances, domestic spending would expand, while the interest rate may either rise or fall (depending, in particular, on whether the new expected growth path is associated with higher or lower variance of income). If there happens to be an overshooting of expectations (or, more generally, if for some reason there is a downward shift in expected future income), the way in which the adjustment takes place when agents revise their forecasts would vary according to whether it is borrowers or lenders who start changing their minds about the growth potential, and according to whether the news to which the agents are responding modify the perceptions about the features of the "best case scenario", or those of the "bad state". If this last case applies, the adjustment would start with a credit contraction.

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and will show relatively large probabilities of default.

5. Discussion

We have tried to build elements of an analytical framework that may help to understand some classes of large-amplitude cyclical movements, such as those which have been observed in Latin America in recent years, and were briefly described in a previous section. Indeed, these fluctuations (or aspects of them) have been interpreted in different ways. In particular, several authors (e.g. Maia and Ortiz (1995), Uribe (1995), Roldós (1995)) have developed models in which increases in aggregate demand, coupled with real appreciations and trade deficits, are rationalized as equilibrium responses to correctly perceived improvements in economic prospects. Another related group of arguments focuses on the incomplete credibility of policies: if agents expect that an exchange-rate based disinflation will be short-lived, they may plan to change the time profile of consumption, with an increase during the period in which the inflation tax is low, and a (pre-programmed) contraction when the unsustainable program is abandoned and inflation rises again (cf. Calvo (1986), Kiguel and Liviatan (1992), Mendoza and Uribe (1996), Talvi (1995)).

Clearly, various patterns of movements in spending and relative prices can be obtained in perfect foresight models according to the impulse (present or future)

acting on the system (cf. Heymann (1994)). These patterns include as possibilities fluctuations in aggregate demand and the real exchange rate. In addition, some variables may show sudden changes (e.g. an abrupt fall in foreign reserves just before a devaluation, as in Krugman (1979)). But, in such models, the plans of agents are never disturbed[18]. In particular, the recession, if and when it comes, is part of a spending and production program that agents have knowingly chosen from the start.

The perfect foresight models have shown that many economic configurations can emerge as a consequence of accurate expectations. However, this does not imply that all such configurations must be predicated on correct judgments; rather, those arguments can be taken as indicating that it may be hard to distinguish good from bad forecasts (so that people may act on the basis of misperceptions without being able to realize it simply by observing the state of the economy). The fact that some set of future events may validate current plans does not mean that expectations are correct[19]. In the perfect foresight arguments based on lack

[18]Except for "unexpected shocks " to which agents have been attributing zero probability, and will (it is implicit in the argument) again consider practical impossibilities once they have absorbed the "news "of one such event.

[19]Moreover, the multiplicity of possible perfect-foresight interpretations of the changes in some economic variables also poses problems, since each specific model has different implications for the future path of the system: should an individual conclude that a rise in current aggregate consumption signals future inflation (as in the credibility-based arguments), or should

of credibility of stabilization, for example, (eventually) successful programs should not be associated with consumption cycles. But, actually, sometimes they are.

In any case, sharp recessions like those mentioned in section 2 seem difficult to reconcile with the absence of expectational errors. In fact, these contractions have not generally been interpreted as well anticipated episodes. A recent literature has modelled crises as sunspot phenomena, that it, as events resulting from the coordination of individual expectations on the basis of some random shock which is not part of the economy's fundamentals (cf. Calvo (1996), Cole and Kehoe (1996), Sachs et al. (1996)). Although the sunspot models can rationalize the sudden drop in the demand for domestic financial assets that is usually observed in crises, the question naturally arises about how agents come to coordinate their expectations on a certain (more or less arbitrary) variable. In addition, the arguments do not specify whether one should assume that the coordination of expectations "spontaneously "takes place, without prior notice, once the shock that triggers the

she anticipate a higher total output? In addition, that same multiplicity goes against the often heard statement that introducing misperceptions into a model means that "anything can be rationalized", and that this is not the case under the rational expectations assumption. When one is analyzing a certain episode (without knowing the future), a perfect foresight argument that rationalizes observed behavior on the basis of expectations of some future event simply postulates that this event will actually happen: one avoids a discussion about how the beliefs of agents may have been formed, and about whether the evolution of the system is likely to confirm those beliefs.

crisis has been observed, or whether agents have been all the time incorporating the (objective) probability of the particular shock (and the consequent run) into their plans: The second scenario does not appear too plausible; in the case of the first one, individuals would have misperceived the economy's behaviour by not taking precautions against the likelihood of a crisis.

An important set of literature has emphasized the influence of the movements in international interest rates on the recent fluctuations in Latin America (cf. Calvo et al. (1993). It seems clear that changes in international credit markets had a strong effect in directing financial resources towards certain countries during some periods, and away from them at other moments. In addition, perceptions of the creditworthiness of highly indebted economies may depend significantly on the level of world rates. Better terms of foreign financing of course induce increases in spending; in particular, the stock adjustment in household durables may generate wide swings in consumption expenditures. At the same time, it is not possible to analyze the effects of the changes in international interest rates without considering the behavior of the demand for credit and, therefore, the income expectations of the domestic agents. Also, the effects of shifts in world

rates would depend on whether they have been built into expectations[20]: the accuracy of wealth perceptions depends on whether future flows are properly discounted or not.

Our argument does not deny the role of international credit conditions, or the existence of contagion effects in financial disturbances. However, international impulses can only account for part of the cyclical behavior (since different economies have performed quite differently for given international conditions), and phenomena like crises and bank runs do not come "out of the blue" (cf. Kaminsky and Reinhart (1996)): while such events need not be triggered by large changes in opinions about fundamentals, a state of skepticism about those fundamentals seems a necessary condition for them to happen[21]. The analysis that we have presented here does not deal with all the aspects of the previously referred cyclical episodes: in particular, we do not study the specific features of the "crisis" periods. But the

[20]In this regard, it seems convenient to distinguish clearly between external, and "exogenous" changes. In a rational expectations model, changes in the international interest rate should not automatically qualify as shocks: if the hypothesis is taken at face value, agents would form their expectations using a model that encompasses the "systematic components "of the relevant variables belonging to foreign economies.

[21]In some models, "bad "equilibria exist in some economic configurations, and not in others. For example, Sachs et al. (op. cit.) argue that balance of payments crises are possible for sufficiently low levels of the ratio of foreign reserves to the liabilities of the financial system. However, the value of this coefficient does not determine by itself the probability of a crisis. One could find cases where, say, a fall in the reserves/M2 coefficient may be interpreted as "good", rather than "bad " news; consider, for instance, a situation where the public has (correctly) more optimistic views about credit risks, and shifts its demand from base money to deposits.

discussion in section 2 indicated that there was indeed ample room for very large revisions in perceived permanent incomes. In turn (as was argued in section 4) revisions of beliefs about the future performance of an economy can produce substantial changes in the terms on which its residents can obtain credit. It does not seem farfetched to assume that changing expectations about future real growth and relative prices contributed to the fluctuations in spending in those cases.

In our framework, people may reasonably believe that an economic expansion is "sustainable ", while it is driven in part by inconsistent expectations, or symmetrically, they can underestimate growth prospects and, therefore, spend below their actual possibilities. If mistakes are being made, they will be discovered only over time (possibly, a not-too-short period of time). The potential for errors need not derive from the lack of sophistication of agents, but from the difficulties inherent in understanding the processes that drive the variables of interest. The same difficulties apply to the analyst. Therefore, one cannot easily predict the cyclical evolution: if prediction was simple, that would in fact contradict the argument. However, this does not make the argument lack content. Rather, the (quite commonplace) point that sometimes the signals that the economy delivers need not have a clearcut interpretation indicates that it may be wrong to rule out errors

on the part of agents on pure a priori grounds –and it gives actual meaning to the learning that the analyst conducts.

Policy makers acting in an economic transition of some sort must decide on the basis of their judgment about how the economy will perform; this, in turn, implies determining a view of how private agents form their expectations (cf. Greenspan (1997), also Bomfin (1996)). The problem arises even when policies have very specific objectives (or are bound by some rule to aim for them): for example, fiscal authorities whose only concern is to "balance the books "over a certain time period have to forecast future revenues; this means that they must try to identify the economy's trend, and attempt to find out whether the current evolution conforms to that trend or not. This will require "choosing a mode of analysis", probably among several alternatives. The choice will not necessarily be optimal; that cannot be known in advance. But a choice is made, anyhow (as is the case with private agentes when they define their plans), and it will have macroeconomic effects. It seems therefore reasonable that policies recognize this fact, taking into account both their own uncertainties and those confronting private agents.

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