15. ENDOGENOUS ECONOMIC POLICY

■ After working through this lecture, you will know:

- Why **government policies may create booms** and recessions rather than fixing them.
- What a **political business cycle** is, and what it looks like.
- What **time inconsistency** means, and why it may lead into **equilibria with undesirably high inflation rates**.
- How to view **monetary (and fiscal policy) in the context of a game between the government and the labour market**, in which the labour market makes the first move.
- That **ways out of the time inconsistency trap** include tying the hands of policy-makers, making them more susceptible to reputational considerations, and making them act more conservatively in terms of concern for price stability.

■ **Policy-making** is the **control of macroeconomic instruments**, say, the decision to raise taxes, the official interest rate or to intervene in some market. **Institutions** provide guidelines or restrictions for policy-makers.

■ We completed the tool-box for understanding **how economies work on the aggregate level**. And this is **where conventional textbooks usually stop**. But it falls short of what we need in order to understand many current macroeconomic events. **How particular institutions affect the economy?**

■ Therefore, it should also be clear that economies **are where they are and face the problems they do because of** the policies that were conducted and because of **the institutions that were constructed or inherited**.

■ But since **neither policy choices nor the design of institutions do regularly follow the recommendations of economists**, we must next ask **what determines the choices of policy-makers and the design of institutions**. Conventional macroeconomics is not equipped to answer such questions. It is these questions and related issues that will be addressed in this lecture.

What do politicians want?

■ When economists set about explaining the **decisions of consumers, firms, investors, households, workers** and any other players in the economic arena, they follow an established **standard procedure**. Step 1 identifies the **available options**. For a household, these are

given by the **budget constraint**, which reduces purchasing options to those that the household can afford. Step 2 picks the **best option** out or affordable options. This requires the specifition of **preferences**: that is, what consumers like and how they rank their options.

■ Steps 1 and 2 are **standard fare in microeconomics**. The **building blocks of macroeconomic models are also thought to reflect the optimal choices** of individual decision-makers, sometimes in an explicit, non-compromising fashion (microfoundations), and sometimes in an indirect, simplifying, pragmatic way (*ad hoc*).

■ Curiously, when **economists** talked about monetary and fiscal policy issues in the not too distant past, they **naively assumed that all they had to do was confront the policy-maker with their recommendations**, and he or she would implement them. Such **a view of policy-making is obviously not consistent with how economists analyze the behaviour of other actors** – and this is changing.

■ **In order to understand why policy-makers conduct the policies they do**, sometimes adopting, but frequently ignoring advice from economists, and why they shape institutions the way they do, **we must also follow standard procedure**.

Step 1: the constraint

■ The **options of the government are restricted by the economy**, by the interplay of goods prices, interest rates, wages, exchange rates, income and so on, as it results from the interaction of various markets. In the context of our current discussion the **economy is condensed into the DAD-SAS model**. In the very **short run** – that is, within the current period – **demand-side (monetary and fiscal) policies geared towards shifting DAD are restricted in what they may achieve by the short-run SAS curve**.

Step 2: the preferences

■ Like everybody else, **politicians maximize utility**. However, this assertion is trivial – in fact, useless. You cannot put it to use or prove it wrong unless you become more specific about the things that yield utility to politicians. Economists do that in other fields too: utility maximization of firms is often narrowed down to profit maximization. Trade union utility was represented by the wage sum. Individuals are often thought to maximize income.

■ Now **what do politicians maximize?** Things that they appear to be interested in include **changing the course of their country according to what they think is good** – such as a

proper **place in the history books, power, prestige**, and much more. This makes for a rather **complicated utility function**, and it is hard to see how it fits into our DAD-SAS model.

■ Fortunately, **two arguments make politicians' preferences more transparent and more useful** for our purposes. First, **many of the above** and other things that politicians are presumably interested in **can only be pursued properly when in office**. So politicians who need to be elected must **pay close attention to public support**.

■ Second, **public support for governments very much reflects how the economy is doing** (a case in point is former US President Bill Clinton's 1992 War Room slogan, "It's the economy, stupid!"). When making that judgement, **the public measures the state of the economy by a digestible number of key indicators**.

■ The **key variables** emerging from decades of empirical research are **inflation and unemployment**, both of which **the public likes to be low**. Since unemployment is low when income is high, and vice versa, we may also postulate that **the public likes low inflation and high income**. This way the public's preferences are expressed in terms of exactly those **two macroeconomic variables** measured along the axes in the graphical treatment **of the DAD-SAS model**. This will come in handy below.

■ Let **public support for the government depend on inflation π and income Y** according to

$$s = \bar{s} - 0.5\pi^2 + \beta Y \qquad 15.1$$

where ***s* stands for the public support of the incumbent party** or government, say, as **measured by the vote share received at an election** or in an opinion poll. We will give an alternative interpretation to this equation below. As displayed in Figure 15.1, public support or government utility, if **public support** is what the government is interested in, **rises as income rises, and falls, at an accelerating pace, as inflation goes up**.

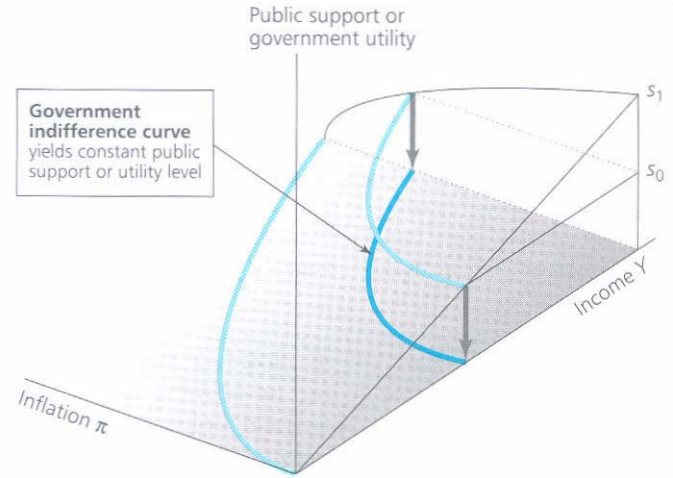

Figure 15.1: Public support for the government rises linearly as income rises. It falls faster and faster as inflation increases. A given level of support, s_0, determined by placing a horizontal cut at the appropriate height, can result from different combinations of inflation and income. The cut determines this curved line, which can be projected down onto the inflation-income surface. Placing the cut higher up at s_1 gives an indifference curve further to the right.

■ To represent government preferences in 2D on the inflation-income plane we may resort to the concept of **indifference curves**. **Government indifference curves combine all macroeconomic outcomes that yield a given level of public support**, say s_0. In order to obtain this indifference curve (which, in fact, is an **iso-support curve**), slice horizontally through the 3D vote function at a height s_0 indicating the vote share you want to maintain.

■ The curved edge of this slice aligns **all pairs of inflation and income that guarantee the government the support s_0**. This curve can be projected down onto the π-Y surface. To identify macroeconomic situations that yield a higher support level s_1, just place the horizontal cut higher at s_1. Projected down onto the π-Y surface, this indifference curve (not shown here) is to the right of the previous one, reflecting, of course, that **as we move right towards higher income levels, the government draws more votes**. Figure 15.2 shows a set of government indifference curves.

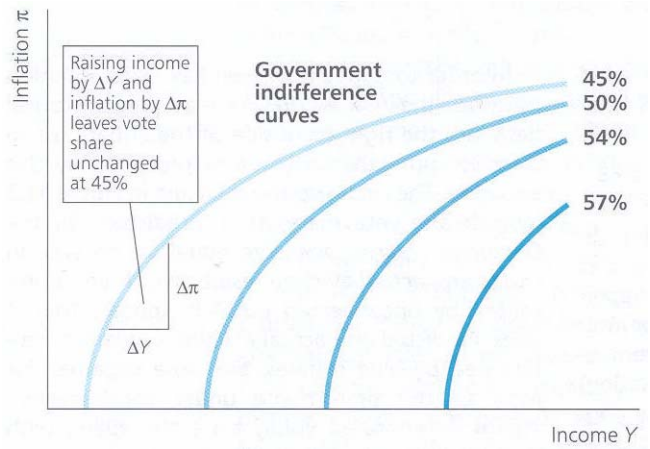

Figure 15.2: Government indifference curves or iso-support curves represent greater support by voters or the public if they are located further to the right.

Box 15.1: Elections and the economy

This lecture's **discussions of political business cycles and the inflation bias crucially**

depend on whether the state of the economy, as measured by a parsimonious set of macroeconomic variables, **is a key determinant of public support** for political parties and electoral success. Professor Ray Fair of Yale University has confronted this idea with real-world data in the context of US presidential elections.

He proposes that election outcomes as measured by VOTES, the percentage of the two-party vote received by the incumbent party, are being determined by **two sets of variables**. The **first set is political or structural**. It captures information like whether there is an **incumbent president**, or whether the **country is at war**. The **second** set adds **economic variables** to this equation. These are

INFLATION (since the last election)
GROWTH (per capita income growth during the election year)
GOODNEWS (the number of quarters since the last election, during which per capita income growth exceeded 3.2%)

Referring to the non-economic part of the equation as *OTHER*, Fair's 2008 estimate of his election equation reads

$VOTE = OTHER - 0.657 \cdot INFLATION + 0.68 \cdot GROWTH + 1.075 \cdot GOODNEWS$

The numbers reported in this equation were **derived from actual data on votes**, inflation, and so on, by means of statistical methods. They state that **when inflation rises by 1 percentage point on an annual basis, the incumbent party loses 0.72 percentage points of its votes**.

One more percentage point of per capita income growth during the election year adds 0.7 percentage points. And **one more quarter during which per capita income growth exceeded 3.2% adds 0.91 percentage points** to the incumbent party's share of votes.

In order to gauge how well Ray Fair's equation describes the real world, we may plug historical data into the right-hand side of the equation and then compute the vote shares proposed by this equation.

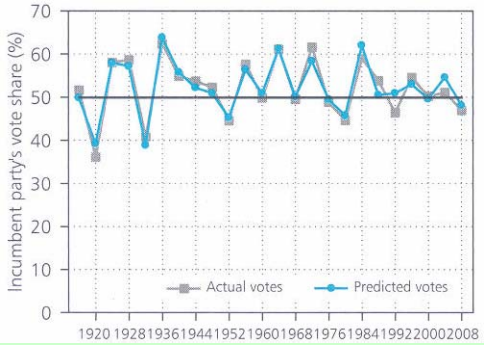

Figure 15.3: Actual and predicted votes

The circles on the solid line in the Figure above indicate the vote shares thus "predicted"" for the Democratic party. **Does the equation do well in explaining actual election results**, which are represented by unconnected dots? **It appears that it does**. Predicted and actual election outcomes, represented by blue squares, are close together for most of the time frame under consideration.

Things deteriorated visibly since the 1990s, with the equation predicting election outcomes

less accurately from 1992 to 2004. It still succeeded in identifying the winners correctly, however, with the exception of **Bill Clinton's surprise win over George Bush in 1992**. In 2008 the Fair equation's prediction was spot on again.

The performance of Fair's US presidential **election equation lends support to the hypothesis that a country's economic performance is a key determinant of election outcomes**, as proposed by the public support function (15.1), which plays a key role in this lecture.

More on Ray Fair's election equation, including regular updates, can be found on his homepage at http://fairmodel.econ.yale.edu/vote2008/index2.htm

Political business cycles

■ **Support levels** in Figure 15.2 are **measured and ranked in terms of government vote shares** achieved at (hypothetical) elections. **Actual elections are not being held every period**, however, but only at more or less regular intervals. If the **government** primarily cares about remaining in office, it needs only **worry about public support during years or**

quarters in which an election takes place. How does public support translate into an election result?

■ Being rational individuals, **voters vote for the incumbent government if it is expected to produce a better performance than the challenging opposition parties** during the forthcoming term. Since **voters have little incentive to become very well informed**, they are likely to **settle for an economic forecast of this performance that simply extrapolates current (and, possibly, recent) achievements** into the future.

■ To construct the simplest conceivable case that can also be easily dealt with in a graph, **let voters cast votes on the basis of election-year macroeconomic performance only**. **Anything that happened prior to the election year is completely ignored (or forgotten)**.

■ Then the **indifference curves** depicted in Figure 15.2 **may also be considered iso-vote curves**. They directly **translate election-year inflation and income into a government vote share**.

■ **Assume**, to keep things simple still, that **election periods and non-election periods alternate**. The interests and **behaviour of the government in these two periods are quite different**.

■ **During election periods the government tries to produce a state of the economy that yields the highest vote share** according to equation 15.1. By contrast, **states of the economy during non-election periods are not being judged by the government on the basis of the public support they spawn immediately**, but on the basis of **their effect on the public support that can be generated when the next election comes up**.

■ What does all this mean for our understanding of economic policy? **For a start, let the economy be in the no-inflation equilibrium** given by point A in Figure 11.4.

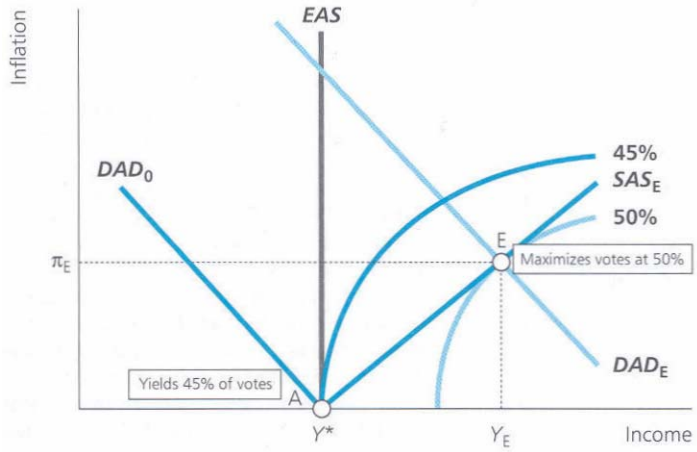

Figure 15.4: Let SAS_E be the aggregate supply curve during the election year. Then SAS_E describes all combinations of inflation and income that the government can generate by manipulating the *DAD* curve. The maximum vote share obtainable in our arbitrary numerical example is 50%. It results if DAD is moved into DAD_E, where SAS_E is tangent to an iso-vote curve.

■ Assume that **we are in an election year** and the **aggregate supply curve is in position SAS_E**. The government knows that **votes will be cast on the basis of this year's economic**

performance. **Iso-vote curves indicate how the state of the economy translates into votes**. The government's **vote share rises as we move onto indifference curves positioned further to the right**. What are the **government's options?**

■ One option is to **keep inflation at zero**. The **economy stays put in the current non-inflationary equilibrium – and the government is voted out** of office with a vote share of 45%. A second option is to **switch to expansionary policy**. This shifts *DAD* to the right, and, **for given inflation expectations, the economy moves up SAS_E**.

■ As we move up *SAS*, **election prospects look brighter** and brighter. The reason is that, **at very low inflation rates, voters rate the gain from an income increase achieved by moving up SAS_E higher than the loss resulting from the accompanying increase in inflation**.

■ But this does not go on for ever. **At point *E*, where SAS_E just touches one of the indifference curves, these two effects balance exactly**. If we moved **beyond** this crucial point, **election prospects would begin to deteriorate**. So the best thing a government with an eye on getting re-elected can do is to **stimulate the economy just enough to bring it to point E**. This situation maximizes the government's vote share. In the graph it just secures re-election with a vote share of 50%.

■ **A situation as given by E cannot be sustained**. If the government raises inflation to π_E in the election year in order to raise income and win the election, **inflation expectations will be higher in the year after the election**. In the simple case $\pi^e = \pi_{-1}$ this shifts *SAS* up to SAS_N for the non-election period, making for a **much less favourable trade-off when the next election comes up** (see Figure 15.5).

■ **How is the government going to respond** to this? Is it going **to regret that it started to meddle with the economy for re-election purposes in the first place?**

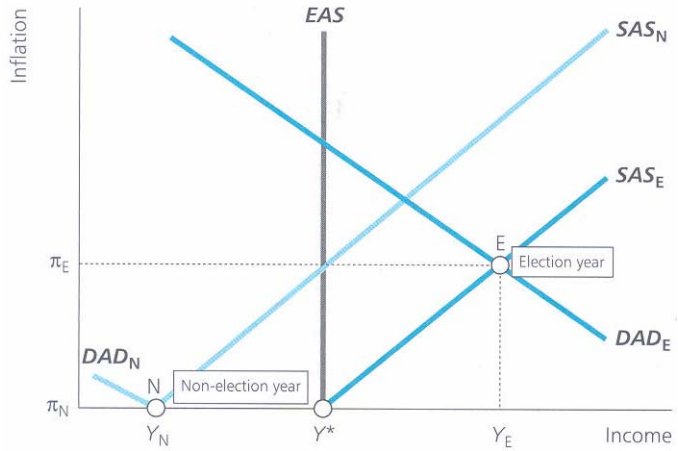

Figure 15.5: Instead of keeping the economy steady at the best point on *EAS*, which is $\pi = 0$ and $Y = Y^*$, a government that maximizes votes at periodic elections may deliberately want to make the economy fluctuate. Monetary of fiscal expansion moves the economy to *E* in election years. Restrictive policies move *DAD* down and the economy to N in non-election years. Note that oscillating between E and N is only one political business cycle, one that illustrates the logic. The government could drive votes still higher by creating an even worse recession during non-election years, with a negative inflation rate.

■ That **depends**. Under **two conditions** it need **not really have any regrets**. Remember that **public support during non-election periods does not matter** to the government. **If inflation expectations are formed adaptively** and **if voters forget or discount past states of the economy**, the **government can bring down inflation by generating a recession in the non-election period without costs in terms of future votes**.

■ Assume that **it wants inflation expectations to be back to 0 for the next election period**, so that *SAS* will be at SAS_E again. Then **all the government has to do in the non-election period is shift down the *DAD* curve** to DAD_N, thereby **creating a recession and squeezing inflation** out of the system.

■ **By the time the election arrives** next period, this **recession will already be forgotten**. The **government may again stimulate the economy**, move up SAS_E to E, and win the election.

■ Note the **blasphemy in this result**: the **government**, the principal addressee of economists' advice, the very **institution that we expect to draw on our improved understanding of how the economy works to smooth the course of the economy, uses just this understanding to generate booms and recessions** that would not be there otherwise. Since

this business cycle is generated by politicians, for political reasons, it is called a **political business cycle**.

Political business cycle mathematics

■ Figure 15.5 shows one political business cycle that illustrates how the government can improve its reelection prospects by creating election-related ups and downs of the economy. This **section shows what the vote-maximizing political business cycle looks like**.

■ The **economy is described by the *SAS* curve with simple adaptive inflation expectations** $\pi^e = \pi_{-1}$.

$$Y = Y^* + \frac{1}{\lambda}(\pi - \pi_{-1}) \qquad 15.2$$

■ By manipulating the *DAD* curve the **government can generate any inflation it wants**. We therefore **assume, as a short cut, that the government controls inflation**. This makes ***π* a policy instrument**. Voter **support** derived from the state of the economy during a given period **depends on inflation and income**:

$$s = \bar{s} - 0.5\pi^2 + \beta Y \qquad 15.3$$

■ The use of mathematics permits us to **drop the assumption that voters forget past economic performance completely**, which we employed to facilitate graphical analysis. Now votes are being affected by current and past economic performance:

$$V = s + \omega s_{-1} \qquad 15.4$$

where ω is a voter **memory coefficient** restricted to the range between 0 and 1.

■ By substituting equations 15.2 and 15.3 into 15.4 **we make the government vote share *V* dependent on (current and past values of) the policy instrument alone**, which the government controls:

$$V = -0.5\pi^2 + \frac{\beta}{\lambda}(\pi - \pi_{-1}) - 0.5\omega\pi_{-1}^2 + \omega\frac{\beta}{\lambda}(\pi_{-1} - \pi_{-2}) \qquad 15.5$$

■ The constants Y^* and $\bar{s}$ have been set to zero to obtain a more compact equation. This will not affect our results.

■ The question we are asking now is **what pattern of inflation maximizes the government vote share**. If election and non-election periods alternate, then the government vote share received during an election, V, depends on inflation during this election period, π, on the inflation rate during the preceding non-election period, π_{-1}, and on inflation two periods ago, π_{-2}, when there also was an election.

■ If we are looking for a repeatable cycle, one that is optimal when it is repeated over and over again, **π and π_{-2} must be identical because they both refer to election periods**. Using the subscripts E and N to indicate whether a variable refers to an election or a non-election period, we may therefore write

$$V_E = -0.5\pi_E^2 + \frac{\beta}{\lambda}(\pi_E - \pi_N) - 0.5\omega\pi_N^2 + \omega\frac{\beta}{\lambda}(\pi_N - \pi_E) \qquad 15.6$$

■ **Election-period inflation π_E is optimal if, by changing it, we cannot raise votes any further**. Mathematically speaking, the **derivative of V_E with respect to π_E must be zero**.

■ From this first-order optimality condition

$$\frac{\delta V_E}{\delta \pi_E} = -\pi_E + \frac{\beta}{\lambda} - \omega \frac{\beta}{\lambda} = 0$$

it follows that the **vote-maximizing inflation rate during an election** period is:

$$\pi_E = (1-\omega)\frac{\beta}{\lambda} \qquad 15.7$$

which is positive. By analogous reasoning, the first-order optimality condition

$$\frac{\delta V_E}{\delta \pi_N} = -\frac{\beta}{\lambda} - \omega \pi_N + \omega \frac{\beta}{\lambda} = 0$$

tells us **what level the inflation rate needs to be set to during non-election periods** if we want to maximize votes during elections:

$$\pi_N = -\frac{1-\omega}{\omega}\frac{\beta}{\lambda} \qquad 15.8$$

■ Since $\pi_N < 0 < \pi_E$ the **inflation rate fluctuates between positive and negative values in the rhythm of elections**.

■ The **amplitude of these swings depends on three parameters:**

- First it depends on β, which measures the **weight of income in the public support function**. **The greater this weight, the more pronounced is the cycle.**
- Second it depends on λ: **the smaller λ, the flatter the *SAS* curve, the larger the cyclical swings**.
- Finally, it depends on ω, the voter **memory parameter**.

■ Equations (15.7) and (15.8) reveal that the **political business cycle is crucially dependent on whether voters forget past events**. If they forget past periods fully, political business cycle swings become infinitely large. **If voters do not forget at all** ($\omega = 1$), the **political business cycle disappears** and inflation is being kept constant at $\pi_N = \pi_E = 0$. Income then remains at Y^*.

Rational expectations

■ As has just been indicated, the **possibility of a political business cycle derives from the assumption that inflation expectations are being formed adaptively**. Adaptive expectations are an **economical forecasting scheme** wherever they perform well, or if it is not easy to improve upon them. **How well do adaptive expectations perform** and how difficult is it to improve upon them in the context of the political business cycle?

■ **Expectations are never correct during the political business cycle**. The election year **boom is created by inflating unexpectedly**. The non-election year **recession is due to a surprise disinflation**. Hence, formation of **adaptive inflation expectations commits systematic errors** that follow the simple time pattern given in Figure 15.6.

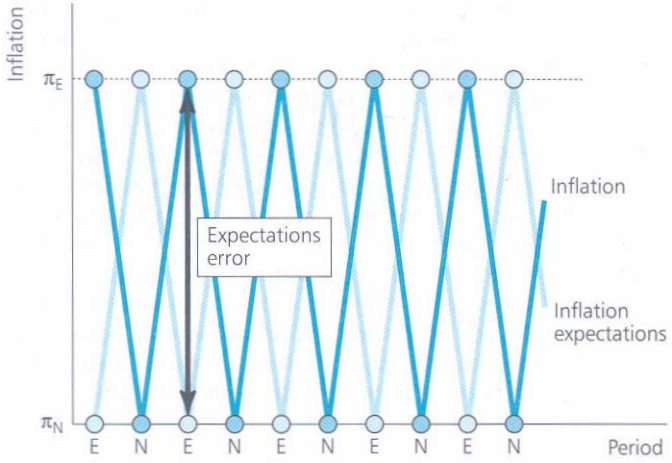

Figure 15.6: In the two-period example of a political business cycle, inflation is always π_E in election years and π_N in non-election years. Inflation expectations lag behind by one period, thus following just the opposite pattern. Expectations errors also follow a very easy-to-recognize two-period pattern.

■ **If the government were to exploit adaptive expectations** formation repeatedly, **individuals would soon see through the emerging pattern**. Is it difficult to **improve**

inflation forecasting? Not really – all that individuals need to realize is that **demand expands during election periods and contracts when there is no election**.

■ **What complicates rational expectations formation** in the context of the political business cycle **is that where the government puts the *DAD* curve is not independent of the expected inflation rate**.

■ On the other hand, rational expectations formation is facilitated by the fact that, even though the position of the *DAD* curve that maximizes votes depends on π^e, the **government always generates the same election period inflation rate**. Given the vote function (15.1) above, this vote-maximizing inflation rate is β/λ.

■ Why? In π-Y space the SAS curve writes $Y = Y^* + \lambda^{-1}(\pi - \pi^e)$ with slope $dY/d\pi = 1/\lambda$. The vote function rearranges to $Y = \beta^{-1}(s - \bar{s} + 0{,}5\pi^2)$ with slope $dY/d\pi = \pi/\beta$. **Votes are highest where both slopes are equal**: that is, when $\pi = \beta/\lambda$.

■ If this sounds a bit abstract, consider Figure 15.7.

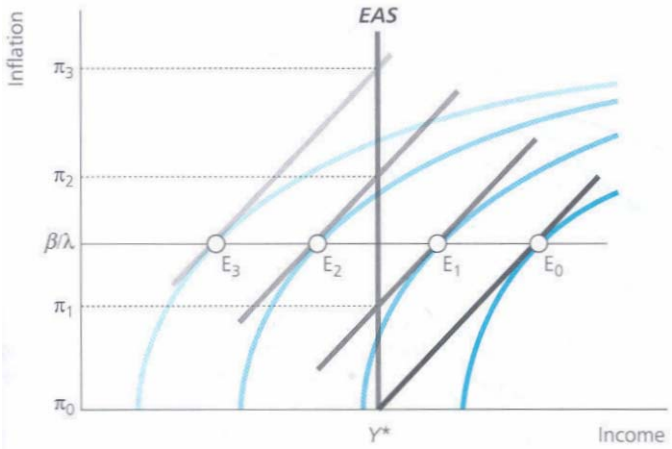

Figure 15.7: The public support function employed here has a special property. No matter what inflation rate is expected, i.e. no matter where the *SAS* curve is positioned, public support is always maximized by generating the same inflation rate $\pi = \beta/\lambda$. This may require different rates of money growth, however, depending on which inflation rate is expected.

■ Figure 15.7 contains **a set of aggregate supply curves, each reflecting a different expected inflation** rate. **Once inflation expectations have been formed and wages have been negotiated, the *SAS* is fixed** to a unique position.

■ **Given this position, and no matter where it is, the government stimulates demand so as to move up along *SAS* to the point where it is tangent to an indifference curve**. In the diagram we end up at E_1 if expected inflation is π_1, at E_2 if expected inflation is π_2, and so on.

■ With the particular vote function employed here, it turns out that **all Es obtain at the same inflation rate β/λ**. In other words, no matter what inflation the labour market expects, the government always produces the same inflation rate β/λ.

■ So an **economy that anticipated the election-related "stop and go" policies of the government rationally expects inflation to be at β/λ during the next election period**. The economy does not then end up at E as planned, but at E' instead (see Figure 15.8).

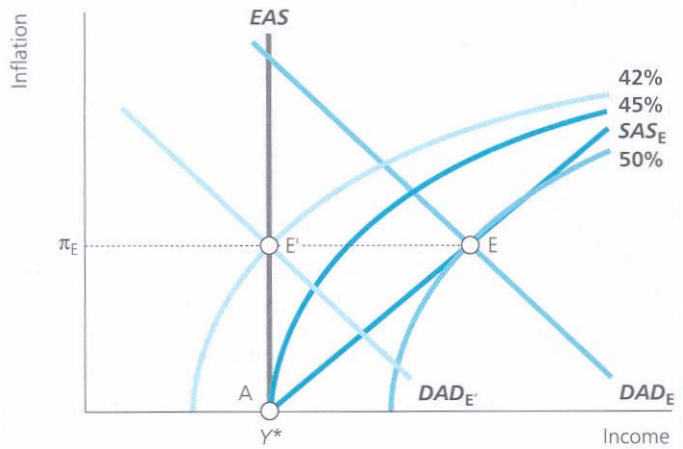

Figure 15.8: Once individuals anticipate that the government inflates to β/λ during election years, inflation expectations move up to β/λ and the economy ends up in E' instead of E, the point at which the government was aiming.

■ The **irony** is that, in terms of votes, now the **government is worse off than if it had never even considered manipulating the economy** for election purposes and had stayed at A. Vote shares related to A are 45%, E yields 50%, and E' yields 42% only.

■ The **inflation bias** derived here for the election period **also obtains for non-election periods if income and inflation experienced then are still remembered by voters on election day**. To see this, just **assume that states of the economy during election and non-election periods influence voters' decisions with equal weight**. Then the **period length behind equation (15.1) is a full election term**. But then **elections are implicitly being held in every such period**, and the **rational expectations bias results in every period**.

■ An **alternative way** of arriving at the result that the inflation bias obtains in every period, election or not, is by **adopting a view entertained in a very influential line of research**. It simply states that **politicians are also voters**, and thus **have the same preferences as voters**. **They too like inflation to be low and income to be high**, independent of re-election considerations. So **they try to maximize a utility function such as equation (15.1) at all points in time**.

■ Is there **any way out of the rather unpleasant position** in which the government has been put by people forming expectations rationally? **Couldn't the government simply pledge that it will never again resort to election period stimulations? If individuals buy that, wouldn't it bring the economy at least back to point A?**

■ The big question is **whether the government can succeed in persuading the economy that it will stick to the pledged new course**.

Policy games

■ From a stylized perspective, the **government has two options (to stimulate or not to stimulate)**, and so has the **economy (to expect stimulation or not to expect stimulation)**. Given this, **four stylized outcomes may result** every time this game is played (see Figure 11.9):

- The **labour market does not expect an expansion** and the **government does not expand** (point A).
- The **labour market does not expect an expansion** but the **government expands anyway** (point E).
- The **labour market expects an expansion** and the **government really expands** (point E').
- The **labour market expects an expansion** but the **government refrains from expanding** (point N).

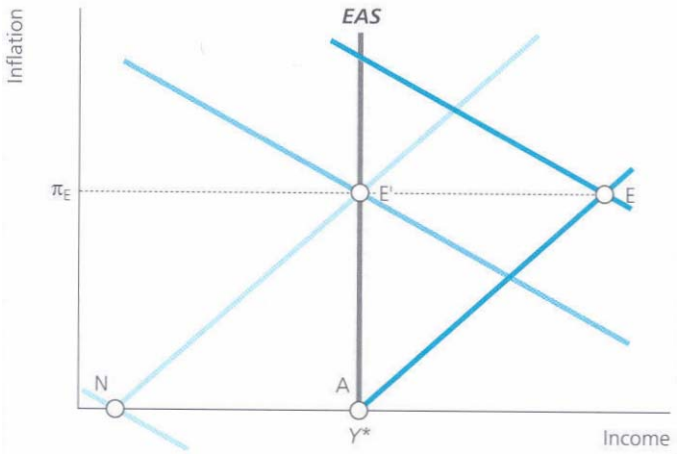

Figure 15.9: Inflation is determined in a "game" between the labour market and the government. First the labour market fixes wages based on an expectation of whether the government will inflate or not, which results in the light or dark blue *SAS* curve, respectively. Then the government inflates to π_E or does not inflate. To inflate always yields higher support than the option not to inflate. Hence, inflation is expected and we end up in E'.

■ Ranking these points in terms of the vote shares they deliver gives E > A > E' > N. You may substantiate this claim by adding the **four relevant government indifference curves** to Figure 15.9. Decision **problems in which the ultimate outcome depends on the moves taken by more than one player** are called **games**.

■ Let's make the current game a bit more specific. The **two players are the government and a monopolistic trade union**. The **union represents labour** in collective wage negotiations so as **to maximize the wage sum**. Assume that the vote-maximizing inflation rate stands at 10%.

■ The **options of the government are either to expand** ($\pi = 10$) **or not to expand** ($\pi = 0$). The trade **union can base wage claims either on an expected expansion** ($\pi = 10$) **or on the belief that the government will not expand** ($\pi = 0$). Table 15.1 presents this game and the possible outcomes in the form of a matrix.

Table 15.1: The policy game between the trade union and the government.

Here the inflation game is cast in terms of specific numbers and a labour market dominated by a monopolistic trade union which maximizes the wage sum. The trade union tries to anticipate inflation correctly, for if it errs,

the wage sum falls. No matter what the union expects, votes for the government are always highest if it inflates. Hence $\pi = 10$ is the dominant strategy, and is expected. The economy ends up at E'.

		Government (maximizes votes; moves second)	
		Does not expand ($\pi = 0$)	Expands ($\pi = 10$)
Trade union (maximizes wage sum; moves first)	Expects no expansion $\pi^e = 0 \rightarrow w = 0$	A $Y = Y^*$; $\pi = 0$ Vote share: 45% Wage sum unchanged	E $Y > Y^*$; $\pi = 10$ Vote share: 50% Wage sum falls
	Expects expansion $\pi^e = 10 \rightarrow w = 10$	N $Y < Y^*$; $\pi = 0$ Vote share: 38% Wage sum falls	E' $Y = Y^*$; $\pi = 10$ Vote share: 42% Wage sum unchanged

■ One feature that we have not mentioned yet is that the **game is sequential**. The **trade union must move first**. It **cannot wait to observe what the government does, but has to form an inflation expectation and commit to a nominal wage for the length of the contract**, typically a year. In a **second step**, after nominal wages are fixed, the **government may decide to inflate or not**, as it pleases.

■ **The best thing that the trade union can do is anticipate the government's reaction**. By making its first step the union effectively **narrows the government's choices down to either**

the top row or the bottom row in the matrix. So the first question to be asked is: **if we, the trade union, decide for the top row by not expecting inflation, what will the government do** subsequently? The **government can choose between inflation** (which yields 50% of votes) **and non-inflation** (which yields 45% of votes). So it will **certainly opt for inflation**.

■ The second question is: **what will the government do if we expect it to inflate**? This puts us in the **second row**. Again, the government's choices are to inflate (which gives 42% of votes) or not to inflate (which gives 38% of votes). And **again, the obvious choice is to inflate**.

■ **Since the government's optimal choice is always to inflate, no matter what the trade union expects, this is called a dominant strategy**. But then **this is also the action that the trade union must rationally expect**. So **under rational expectations the union expects the government to inflate, the government does inflate**, and the economy ends up at point E'.

■ The **importance of this result** derives from the fact that the **country is stuck in a suboptimal situation**. **Voters and the government**, who share the same utility function, **could both be made better off**, without making anybody else worse off, **by reducing inflation**, moving down from E' to A.

■ But within the scenario postulated here, **this does not seem to be feasible**. As long as the **short-run temptation to inflate exists**, a **pledge not to inflate is not credible**. We may say that **democracies, as institutions, have a built-in inflation bias**.

■ What gives rise to this inflation bias is a **general problem called time inconsistency**. It does **not only plague monetary policy**, as discussed here. It is at work **whenever a policy that initially seemed ideal for today and the future is no longer considered to be so by the decision-maker when the time comes to act upon it**.

■ Generations of parents have experienced this problem, without knowing its name. **Efforts to influence their offspring's behaviour often turn into a game in which parents vow stern consequences, but find it preferable not to follow through when it is time to act**. And policy-making in other areas, from **taxing imports** to **paying subsidies**, is haunted by the apparent **impossibility to follow through on a plan which, at the outset, looked perfectly reasonable**.

■ **Repeated games.** Wait, though. Perhaps we only came up with such a worrisome result because **we overlooked the fact that the government and the trade union play this type of game not only once**, as we assume above, but again and again? Let's look into this by **assuming that the government and the trade union play this game twice**.

■ **Couldn't the government's pledge to low inflation during the first round of play become credible because keeping it might carry the added benefit of low inflation expectations** (and, hence, a **more favourable trade-off**) when the game is played the second time? To understand this, let's get more specific again.

■ **The government may consider that if it announced and implemented low inflation this period, it could coax trade unions into also believing a low inflation announcement next period**. This would put next period's *SAS* curve into SAS_E and permit the government to renege on its announcement and maximize utility at E. So the **added benefit from playing the low inflation card this period, to be reaped next period, is to achieve E instead of E'**. The gain in terms of votes (or utility) is 8 percentage points. Next, look at how this affects the game played in the first round.

■ The 8 percentage points **vote bonus next period accrues whenever the government does not expand this period**. So the **effect on next period's votes must be added to the direct benefits of the low inflation strategy**, measured in current-period votes. Adding 8 percentage points to all entries in the left-hand column pushes the total benefit from the does-not-expand strategy to 53% and 46%, respectively (see Table 15.2).

Table 15.2: The policy game with two-period horizon.

If the government not only cares about votes this period, but also about next period's votes, it may consider that playing the no-inflation card this period may make the no-inflation strategy credible next period, offering better options then. The value of this, if it did accrue, would be 8 percentage points difference between a vote share of 50% in E and one of 42% in E'. Adding this to the "does-not-expand" column appears to make no-inflation the dominant strategy. But is this rational?

		Government	
		Does not expand	Expands
Trade union	Expects no expansion	A Vote share: 45 + 8 = 53% Wage sum: 100	E Vote share: 50% Wage sum 95
	Expects expansion	N Vote share: 38 + 8 = 46% Wage sum: 93	E' Vote share: 42% Wage sum: 100

■ **No matter what the trade union does, the best response for the government now appears to be not to inflate**. **Doesn't this turn "do not inflate" into the dominant strategy and remove the inflation bias?**

■ **Unfortunately not** – because our line of reasoning **does not pass the test of rationality**. The flaw is that the **government mistakenly believes that its policy stance today**

influences next period's inflation expectations. **When the game is played the second time, it is the final play**. So the **government need not worry about losing its reputation any more**. It would not do any good one period later. **Trade unions realize this and rationally expect high inflation in period 2**, the final period, and the **government does deliver**.

■ But **when second-round behaviour and outcomes are already determined, efforts to influence second-round expectations are futile**. The 8 percentage points of added benefits written into the "does-not-expand" column in Table 15.2 are not real. **So the government will play the high inflation strategy in period 1**. Since this is rationally expected, both period 1 and period 2 outcomes are E', the inflation bias position.

■ This **line of reasoning can be generalized**. **Playing this game repeatedly**, five times or fifty times, **does not help to get rid of or reduce the inflation bias while there is a recognized final round of play**. By **backward induction** we can always demonstrate that if the outcome in the final round must be E', E' also results in the second last round. But then E' must also result in the third last round, and so on.

■ The **only scenarios that may partly fix or alleviate the inflation bias problem** are:
- first, **if the game is being played an infinite number of times**, or

- second, **if the final round is determined stochastically**, say, by throwing a die.

■ **In both cases there is no previously identifiable final round** from which to trace back the inflation bias to the present. **Reputational considerations may play a role in such a context**, and may help to **reduce the time inconsistency problem**.

■ This innocent-looking result is not trivial. **Popular thought** holds that **politicians can be prevented from drifting away from the preferences of their constituencies by limiting the number of terms they may serve in office**. The foremost example of this is the US presidency. The **results derived here point to the opposite effect**. The only way to keep politicians in line with what is good for voters is by **avoiding fixing a final term in office**.

From the political business cycle to the inflation bias

■ There is a **close link between the political business cycle and the inflation bias**. This becomes evident if we **drop the assumption that the labour market forms inflation expectations, somewhat naively**, by adapting it to actually observed inflation. This leads to the model:

SAS curve

$$Y = Y^* + \frac{1}{\lambda}(\pi - \pi^e) \qquad 15.9$$

Period support function

$$s = \bar{s} - 0.5\pi^2 + \beta Y \qquad 15.10$$

Vote function

$$V = s + \omega s_{-1} \qquad 15.11$$

which is the same as the model employed in the section on business cycle mathematics, **except for the treatment of inflation expectations**. We now assume that **these are being formed rationally, based on knowledge of the model** composed of equations (15.9)-(15.11), and **thus cannot be influenced by manipulating actual inflation**. As elsewhere in this lecture, we assume that π is the government's policy instrument.

■ Upon substitution of equations (15.9) and (15.10) into (15.11) and the use of subscripts E and N to identify election and non-election periods, we obtain the vote function

$$V_E = -0.5\pi_E^2 + \frac{\beta}{\lambda}(\pi_E - \pi_E^e) - 0.5\omega\pi_N^2 + \omega\frac{\beta}{\lambda}(\pi_N - \pi_N^e) \qquad 15.12$$

■ **To determine the optimal** (that is, **vote maximizing) inflation rate during an election period**, we need to note two things:

- first, **inflation expectations have already been formed by the labour market** and found their way into the negotiated money wage; and
- second, the **government cannot influence future inflation expectations by setting current inflation in a specific way**.

■ **The labour market would look through this, because it knows what the government really wants**. So when we maximize equation (15.12) with respect to we treat π_E^e and π_N^e as constants. This yields

$$\frac{\delta V_E}{\delta \pi_E} = -\pi_E + \frac{\beta}{\lambda} = 0 \rightarrow \pi_E = \frac{\beta}{\lambda}$$

and

$$\frac{\delta V_E}{\delta \pi_E} = -\omega \pi_N + \omega \frac{\beta}{\lambda} = 0 \rightarrow \pi_N = \frac{\beta}{\lambda}$$

■ These results say that **under rational expectations vote-maximizing governments always generate the same inflation rate**, independently of whether it is an election or a non-election period. Since the labour market knows this, these inflation rates are expected:

$$\pi_E^e = \pi_E = \pi_N^e = \pi_N = \frac{\beta}{\lambda}$$

■ So **there are no more inflation surprises**. Therefore, **income always remains at potential income**:

$Y_E = Y_N = Y^*$

■ The essence of these calculations is that **when inflation expectations become rational, the political business cycle disappears**. The **economy does not settle into its long-run optimum, however, which is where prices are stable and potential income is being**

generated. Instead, **there is permanent inflation which does not raise income one bit above its potential level**. This is why this **useless level of inflation is called an inflation bias**.

Ways out of the time inconsistency trap

■ Having identified the **apparent inflationary bias in democracies**, are there **ways out of it?** Any such remedy must **tackle the very causes of the inflation bias**. As Figure 15.10 highlights once again, the **inflationary bias, or time inconsistency dilemma**, if you wish, is made up of **three ingredients**:

- The **constraint**, as represented by the ***SAS* curve**. **Anything that would make the short-run or surprise aggregate supply curve steeper would reduce the inflation bias**.
- The **preferences**, as represented by **iso-vote or indifference curves**. **Anything that makes monetary policy care less about income gains (or other gains from surprise inflation) makes indifference curves flatter**. The result is a smaller inflation bias.
- **Instrument potency**. This refers to the **ability of the policy-maker to manipulate the, for example, money supply so as to maximize utility**. **If monetary policy was taken out of the control of the policy-maker, the *DAD* curve could not be shifted**

into the position shown in Figure 15.10. **To the extent that *DAD* has to remain lower, reduced inflation expectations would keep *SAS* lower as well**, removing or reducing the inflation bias.

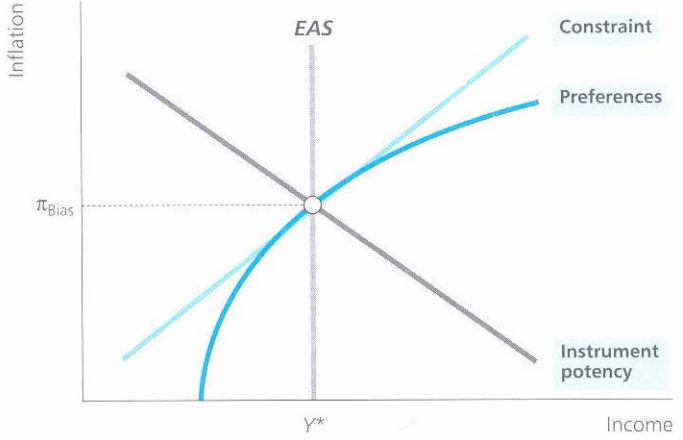

Figure 15.10: The inflationary bias results from the interplay of three factors: the constraint (as represented by *SAS*), restricting available states of the economy; the preferences of the government, implying a short-run temptation to stimulate; instrument potency, which refers to the power of the policy-maker to employ demand management discretionarily.

Modifying the constraint

■ There is **little established knowledge about how the government should make the constraint more favourable**. More than anything else, making the *SAS* curve steeper would call for **more flexible money wages** – say, due to **shorter wage contracts and automatic inflation adjustment clauses**. Under most countries' laws, such things fall under the **autonomy of employers and trade unions**.

Changing preferences

■ A number of things can be done here. Most straightforwardly, if preferences play such a decisive role, why not simply **appoint a person to the position of central bank governor who is known for his or her relentless commitment to price stability**? Such people would have a rather **flat, if not horizontal, set of indifference curves** and could successfully **maintain a high level of price stability**. Figure 15.11 illustrates this effect.

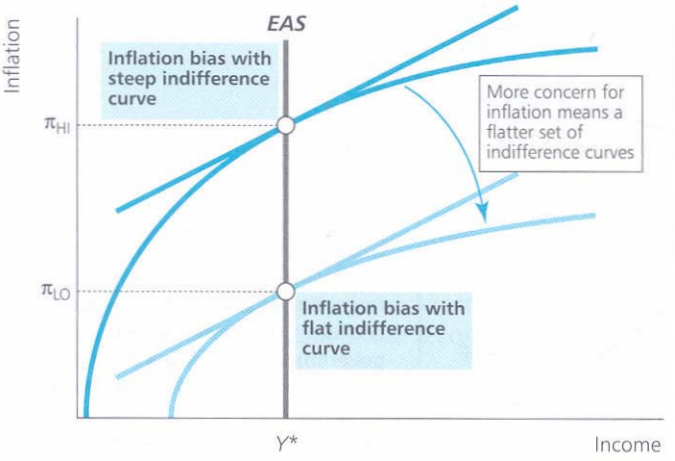

Figure 15.11: If the policy-maker does not care much about higher income, more income is needed as compensation for one more percentage point of inflation. This makes indifference curves flatter and the inflation bias smaller.

- **Two problems** are related to this remedy:
  - First, its implementation may be **painful in terms of income losses**. Any new central bank **governor may have to prove his or her commitment to price stability** and

build up such a reputation over time. During this time, monetary **policy must be more restrictive than expected**, which carries **recessionary side effects**.

- Second, other disturbances, **supply shocks** in particular, **may hit the economy**. In such situations a certain **concern for income on behalf of the central bank may be desirable for society** as a whole.

■ A **second way to affect the preferences** driving monetary policy is by making the **central bank independent of the government**. This only helps, of course, **if the central bank has less to gain from surprise inflation than the government**.

■ This is **quite likely** to be the case. If the indifference curves represent public support or re-election prospects, a **central bank (which does not have to seek re-election) is less likely to care than a government**.

■ **If indifference curves represent politicians' utility, government officials have interests in surprise inflation that go beyond the temporary income gains** discussed above, which central bank officials do not have.

■ Most important among those effects, **surprise inflation reduces the real value of government debt**. This makes surprise inflation very **tempting for the government of a country with large public debt**, but much less so for the central bank.

Eliminating instrument potency

■ As mentioned before, **if monetary policy cannot be employed for surprise-stimulations of aggregate demand, the labour market need not anticipate related inflationary consequences**, and the **inflationary bias is reduced or disappears** altogether. Two options stand out in this context:

- **Adopting a policy rule**. Specifying a **money growth rule** by explicit or implicit contract, **by law, or even in the constitution**, could be done in a number of ways: by specifying a fixed number, of which the **Friedman rule would be an example**; or by **formulating an appropriate response to the general macroeconomic conditions**, as stated in the **Taylor rule**. If this rule is properly designed to **prevent the government or the central bank from using monetary policy to create surprise inflation**, it can eliminate the inflationary bias (see Figure 15.12).
- **Fixing the exchange rate**. A second way to **take monetary policy out of the hands of domestic policy-makers** is by **fixing the exchange rate** to some foreign currency or a basket of foreign currencies. Under such conditions money growth is taken out of

domestic policy-makers' discretion. Instead, it must follow the path required to keep the exchange rate at the fixed level. While long-run inflation is a monetary phenomenon in the sense that it reflects the growth of our money supply, **fixing exchange rates turns it into an imported monetary phenomenon**. The pace of inflation is set by monetary policy in the country (or countries) to which our currency is pegged. This **other country's inflation bias**, which our model calls world inflation, **becomes our inflation bias**. An extreme case of fixing the exchange rate is a **currency union**. In the case of **European Monetary Union** (EMU), **monetary policy is delegated to a supranational authority, the European Central Bank** (ECB). It is the **preferences of the ECB and its independence from member governments that eventually determines the inflation bias of EMU and its individual members**.

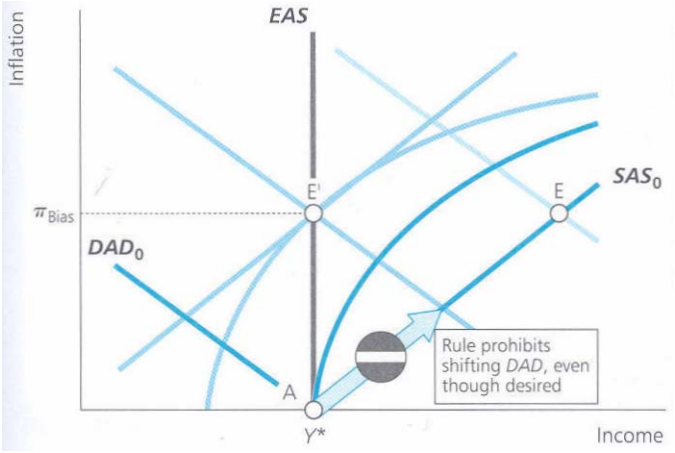

Figure 15.12: The policy-maker would like to move up along SAS_0 towards E. Under rational expectations this would lead into E'. The law ties the policy-maker's hands, freezing *DAD* in DAD_0. Aware of this, the labour market rationally expects zero inflation, which results in SAS_0. The economy stays at the superior point A with no inflation bias. A fixed exchange rate does the same trick. Then A reflects the inflation bias of the country to which we peg our currency.

■ Figure 15.13 illustrates **how committing to a fixed exchange rate can be a way of reducing inflationary bias**. Government and **society may benefit** from doing so **if the inherent domestic inflation bias exceeds the world inflation rate**. If the domestic bias is lower than world inflation, joining a fixed rate system would aggravate the problem of inflation.

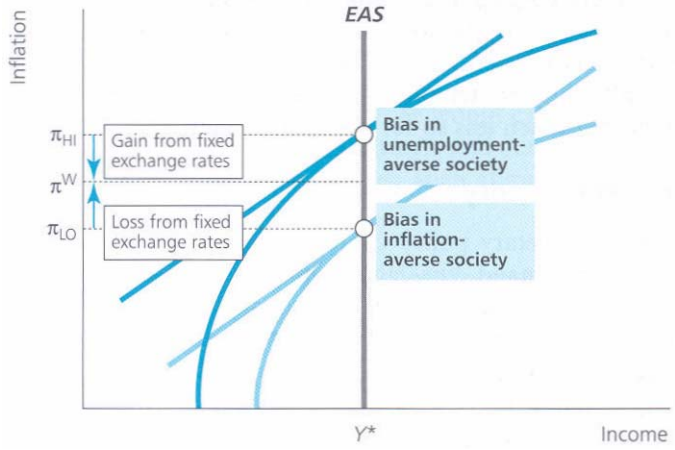

Figure 15.13: If a society or government is strongly averse to unemployment, thus valuing income gains highly, it has steep indifference curves and a high inflation bias. Such a country can reduce its inflation bias by fixing the exchange rate. An inflation-averse country has a low inflation bias. It may experience a deterioration of its inflation performance after fixing the exchange rate.

■ Note, however, that **price stability can only be imported in the described fashion if the exchange rate is permanently fixed, and credibly so**. Periodic **devaluations would drive a wedge between world inflation and domestic inflation**, causing inflation performance to deteriorate.

Summary

Governments favour certain states of the economy over others. While they dislike inflation, they usually welcome inflation surprises. The main reason is that this may generate temporary gains in income, which the government may want itself or expect to draw applause from voters. Another reason that the government may feel tempted to generate surprise inflation is that this may reduce the real value of government debt.

If inflation expectations feature an adaptive element and if voters' memories are not perfect, re-election motives may tempt governments to create a political business cycle.

A political business cycle typically features booming output and income during the time leading up to an election, and a recession soon after the election.

If inflation expectations look through the election pattern, becoming rational, the political business cycle disappears.

A policy geared towards price stability often lacks credibility. Rational inflation expectations anticipate that governments may be willing to trade higher inflation for temporarily higher income. As a consequence, democracies seem to suffer from an inflationary bias.

The inflationary bias may be characterized as the outcome of a game played between the trade union and the central bank. Playing this game repeatedly does not change the outcome, as long as there is a pre-fixed final round of play.

When the final round of play is not foreseen, say because it is determined by chance, reputational considerations may reduce the inflationary bias.

Ways out of the inflationary-bias/time-inconsistency dilemma are as follows:

- Appointing conservative (i.e. inflation-averse) central bankers and making the central bank independent of the government.
- Establishing fixed rules for monetary policy which the central bank must obey.
- Pegging one's currency to that of a country with a proven low inflation record.