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A New Taxonomy of Monetary Regimes

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Abstract

This Working Paper should not be reported as representing the views of the IMF. The views expressed in this Working Paper are those of the author(s) and do not necessarily represent those of the IMF or IMF policy. Working Papers describe research in progress by the author(s) and are published to elicit comments and to further debate.

This paper proposes a new taxonomy of monetary regimes defined by the choice and clarity of the nominal anchor. The regimes are as follows: (i) monetary nonautonomy, (ii) weak anchor, (iii) money anchor, (iv) exchange rate peg, (v) full-fledged inflation targeting, (vi) implicit price stability anchor, and (vii) inflation targeting lite. This taxonomy captures the commitment-discretion tradeoffs that lie at the heart of choosing a monetary regime. During the last 15 years the world has moved toward monetary regimes with less discretion. Empirical analysis suggests that country regime choices reflect the level of financial and economic development and recent inflation history.

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I. INTRODUCTION

The balance between commitment and discretion is the essence of a monetary policy regime. A regime with the right mix of commitment and discretion can help monetary policy attain price stability and stable long-run economic growth. Countries can be assumed to choose the monetary regime that works best for them conditional on their circumstances. This choice is facilitated by a practical taxonomy of monetary regimes that captures the different available combinations of commitment and discretion.

This paper proposes a complete and practical taxonomy of monetary regimes from which policymakers can choose. Such taxonomy has not heretofore been available because macroeconomic analysis has focused on either the exchange rate arrangement, or on inflation targets. Of course, the exchange rate arrangement is a key element of all monetary regimes, but the shrinking number of countries that define their regime by a commitment to an exchange rate peg makes this approach less relevant.[2] Most of the newly flexible exchange rate countries are committing to an inflation anchor. However, the differences in the clarity of the commitments that countries are making to inflation targets result in qualitatively different regime choices.

Monetary regimes are defined here by *the choice and clarity of the nominal anchor*. This definition leads to the following all-inclusive taxonomy of regimes:

> ➢ Monetary nonautonomy
> ➢ Exchange rate peg
> ➢ Full-fledged inflation targeting
> ➢ Implicit price stability anchor
> ➢ Inflation targeting lite
> ➢ Weak anchor
> ➢ Money anchor

The weak anchor and money anchor regimes are no longer used by large and developed countries and thus are included here mainly for historical completeness. The main innovation of this taxonomy is the stress on clarity.

This taxonomy captures the widely different commitment-discretion mixes across regimes. Figure 1 summarizes the within-regime averages of commitment and discretion on a scale of

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[2] Reinhart and Rogoff (2002) and Ghosh, Gulde, and Wolf (2003) are recent contributions to the exchange rate literature; Calvo and Mishkin (2003) question the emphasis on exchange rate regimes. The lack of a consensus in the literature on the determinants of exchange rate choice (e.g., Juhn and Mauro, 2002) may reflect that the exchange rate arrangement makes up only part of a monetary regime.

0 to 100 self-reported by central banks in 1999 (Fry and others, 2000). Countries classified as practicing monetary nonautonomy report the highest commitment and the lowest discretion, while weak anchor and implicit price stability anchor countries report the highest discretion and the lowest commitment, in accordance with the proposed taxonomy.

The empirical analysis of this paper shows that the different regimes correspond to particular structural and historical circumstances. Adoption of monetary nonautonomy is usually preceded by a period of price instability. Inflation targeting lite countries generally have lower GDP per capita, less developed financial sectors, and histories of higher inflation compared to countries with exchange rate or inflation anchors. Exchange rate anchor countries are smaller, less developed, and have shallower financial sectors and higher recent inflation than full-fledged inflation targeting and implicit price stability anchor countries. Finally, implicit price stability anchor countries are larger, more developed, and have deeper and more active financial systems than their full-fledged inflation targeting counterparts.

Central banks around the world are choosing monetary regimes with less discretion over the past 15 years (Figure 2). No longer are there countries with a weak anchor or money anchor regime. In fact, in the last 15 years the number of monetary nonautonomy countries has almost doubled. In this same period, the share of countries with an exchange rate peg has fallen from one-half to one-quarter of the total at the same time as the share of full-fledged inflation targeters has risen from nil to one-quarter. There are also important differences in the composition of regimes between advanced and emerging market countries.

The main policy implications of this paper concern tradeoffs posed by regime switches and the refinement of country monetary regimes. For example, an inflation targeting lite country considering a change to a full-fledged inflation targeting one should make sure that it has the means for a high degree of clarity in monetary policy. In addition, this taxonomy provides a framework for countries considering refinements to their monetary regime in transparency and accountability.

The existing literature on monetary regime choices is quite limited. Several papers stress that consideration of all the elements of the monetary regime is needed to address real-life policy choices (Mishkin, 1999; Mishkin and Savastano, 2002; Berg, Borensztein, and Mauro, 2002; Cottarelli and Giannini, 1997). Mishkin (1999) discusses monetary policy frameworks in terms of (i) exchange rate targeting (including currency boards), (ii) monetary targeting, (iii) inflation targeting, and (iv) an implicit nominal anchor. The taxonomy of this paper differs from that of Mishkin in that exchange rate targeters are separated into peggers and nonautonomous regimes, and the weak anchor, implicit price stability, and inflation targeting lite regimes are added. Moreover, this paper systematically classifies countries into the taxonomy regimes. Cottarelli and Giannini (1997) classify 100 countries into monetary regimes for 1970-94, but their taxonomy is qualitatively different from the one used here. In addition, this paper seems to be the first to empirically analyze the choice of monetary regime.

The paper is organized as follows. Defining a monetary regime generally is discussed in the next section. The definition of the monetary regimes and the classification of countries into these regimes are described in section III. Section IV compares key indicators of monetary policy across the monetary regimes to gauge whether the regimes represent meaningfully different monetary policies. Section V looks at the trends in monetary regimes over the past 15 years. Section VI presents empirical analysis of regime choice. Section VII concludes with an emphasis on the policy implications and areas for future research. The country classifications for 1990-2003 are shown in Appendix I, Appendix II details the classification methodology, and the data used in the empirical analysis are documented in Appendix III.

II. DEFINING A MONETARY REGIME

Monetary policy regimes "encompass the constraints or limits imposed by custom, institutions and nature on the ability of the monetary authorities to influence the evolution of macroeconomic aggregates" (Bordo and Schwartz, 1995). This paper defines different monetary regimes by the choice and clarity of the nominal anchor.

A nominal anchor is a publicly announced nominal variable that serves as a target for monetary policy. A nominal anchor fosters price stability by constraining the value of money and thereby tying down inflation expectations. The potential nominal anchor choices encompasses those based on convertibility into a commodity, generally specie, such as gold or silver; the currency of another country; a common currency in a currency union; a monetary target, an exchange rate target, and an inflation target. Specie anchors are not considered here because they are no longer used.

Clarity is the degree of transparency and accountability of the commitment to the anchor. Transparency and accountability are important for an increasing number of countries owing to the rising popularity of inflation targeting. The lag between changes in the stance of monetary policy and their impact on inflation complicates monitoring of the commitment under this regime and thus requires a high degree of transparency and accountability. In addition, in recent years central banks have become more independent, and accountability helps insulate central banks from political pressures.

Output and financial stability objectives are *not* used to define monetary regimes because they are not transparent and central banks do not hold themselves explicitly accountable for them, important as they may be. All but nonautonomous regime countries can and do use some degree of discretion in monetary policy. Indeed, some central banks are legally obliged to take output stability into account and financial stability can temporarily become the main focus of central banks. However, no central bank has ever quantified a commitment to output stability or other objective in the same way that they hold themselves accountable for a nominal anchor. Therefore, an explicit commitment to an output or financial stability objective cannot be employed to *define* a monetary regime. Nevertheless, output and financial stability are crucial to the *choice* of monetary regime, as stressed later in the paper.

III. THE MONETARY REGIME TAXONOMY AND COUNTRY CLASSIFICATIONS

This section defines the regimes and classifies the larger and more developed IMF member countries into these regimes (see Table 1). Country classifications for 1990-2003 are shown in Appendix I and the details of the classification procedure are documented in Appendix II.

Larger and more developed countries are the focus of this paper because they have a wider selection of regimes and thus offer a richer analytical landscape and more data for empirics. Smaller countries face a narrower set of policy options reflecting their less sophisticated financial sectors and more concentrated production profiles (Mussa and others, 2000). As a result, their revealed preference is for a more limited number of regimes that tend not to be forward-looking.[3] The larger and more developed countries are those with GDP in 2000 exceeding US$4 billion and/or per capita GDP greater than $720. The number of classified countries during the period 1990-2003 ranges from 75 to 85 owing to data availability in the early 1990s for several of the transition countries as well as the formation of the European Monetary Union.

Classification of countries into regimes is in most cases clear-cut while in other cases some judgment is required. There can be a thin line between a country with an adjustable exchange rate anchor and an inflation targeting lite country that influences the exchange rate. This line is drawn by the IMF in its classification of *de facto* fixed exchange rate regime countries. Judgment is also required in classifying moves from a money anchor to another anchor and in a few cases between full-fledged and implicit price stability anchor countries.

Nonautonomous regime countries do not issue an independent currency. These are the countries with exchange rate arrangements classified by the IMF as no separate legal tender (NSLT), a currency board arrangement (CBA), or a currency union arrangement with the currency linked to that of another country (NCU). Nonautonomy is a clear and adhered-to commitment to a nominal anchor which is directly or indirectly the currency of a large country. Central banks practicing nonautonomy report the most commitment and the least discretion of all the monetary regimes. The historical record of adherence to a nonautonomous regime is quite good.[4] NSLT is dissimilar to CBA and NCU in that the latter provide seigniorage revenues, a limited lender of last resort, and are somewhat less irreversible. However, in the broad context of monetary regimes these three are hard to distinguish from each other and thus they will be grouped together in this paper. As of 2003 nine countries had a nonautonomous regime.

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[3] As of 2001, the 95 smaller and less-developed IMF member countries can be classified as follows: 26 had nonautonomous regimes, 27 had an exchange rate peg ,and the remaining 42 countries included inflation targeting lite anchors, weak anchors and monetary anchors.

[4] Argentina (1914, 1929, and 2001), Ireland (1961), Malaysia (1973), and Singapore (1973) are the only countries to have abandoned a CBA—but only Argentina did so from positions of weakness (Baliño and Enoch, 1997).

At the other end of the commitment spectrum are *weak anchor* countries which are defined as those with an average annual rate of CPI inflation exceeding 40 percent.[5] These countries really have no operative nominal anchor and so will not be the subject of much analysis here. Central banks in weak anchor country report a low degree of commitment to a nominal anchor and a high level of discretion. The number of weak anchor countries dwindled from 13 in 1990 to 0 in 2002 in line with the worldwide decline in inflation.

Money anchor countries employ a monetary aggregate as the nominal anchor.[6] Countries with a publicly announced monetary target and a floating exchange rate arrangement are classified as money anchor countries. A monetary target gives the central bank scope to counter domestic shocks but requires a stable relationship between the targeted monetary aggregate and the final goal of monetary policy. Since these relationships are not stable enough to provide strict adherence of actual to targeted money aggregates in practice, money targeting regimes do not follow a strict Friedman-type rule. Indeed, two of the most well known monetary anchor countries—Germany and Switzerland in the 1970s and 1980s—are viewed as having adhered to a de facto inflation objective in practice (Mishkin, 1999; Clarida, Galí and Gertler, 1998).[7] Money targets were used by only five countries in 1990, and by 2000 this regime became extinct, probably reflecting increasing instability in money demand.

Under an *exchange rate peg* the nominal anchor is the value of the exchange rate with respect to another currency—usually that of a low-inflation large trading partner country. Countries are classified as exchange rate "peggers" if their exchange rate arrangement is categorized by the IMF as one of the following: (i) conventional pegged arrangement, (ii) pegged exchange rate within horizontal band, or (iii) crawling peg. These exchange rate arrangements are firm enough to serve as a visible anchor for anchoring inflation expectations. Interestingly, exchange rate peg central banks report intermediate levels of commitment and discretion compared to the other regimes, reflecting that some have an adjustable peg and that even the hard peg countries occasionally adjust the peg. Twenty-one countries had an exchange rate peg regime in 2003.

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[5] An inflation rate of greater than 40 percent is used in Reinhart and Rogoff (2002) to distinguish between their float and freely falling exchange rate regimes, and by Easterly (1996) in his definition of high inflation episodes.

[6] IMF programs typically traditionally included a monetary aggregate target (usually the net domestic assets of the central bank) monitored on a quarterly basis. These targets are not viewed here as constituting a monetary regime because they are short term, not usually seen by the public as a transparent nominal anchor, and often coexist with an explicit exchange rate or an inflation anchor. However, for some inflation targeting countries IMF conditionality is now based on breaches of the inflation target Blejer and others (2001).

[7] See Geberding, Seitz and Worms for an alternative perspective with respect to Germany.

Left over from these three regimes are countries that have an autonomous monetary policy, keep inflation low enough to have at least broadly stable inflation expectations (i.e., do not have a weak anchor), and do not have a money anchor or exchange rate peg. How *do* these countries define their monetary regime? It turns out that all maintain some sort of inflation anchor. However, there are systematic differences in the monetary framework across the countries, and these differences can be used to classify these countries into different regimes. These systematic differences lie in: (i) the clarity of the anchor, and (ii) how the inflation performance is explicitly or implicitly used to define the anchor.

The clarity of a monetary regime is broken down to transparency and accountability. Transparency allows the public to monitor the adherence of the central bank to the inflation objective and is delivered by press releases and a detailed inflation report. Accountability ensures that the central bank is held responsible for its commitment to the inflation target. Formal elements of accountability include explicit involvement of the government in the setting of the inflation targets, a requirement for a central bank to publicly explain a failure to meet an inflation target, or override provisions of the government in the event of a drastic miss of the target. Transparency and accountability are documented in Schaechter, Stone and Zelmer (2000), Schmidt-Hebbel and Tapia (2002), Tuladhar (2004), and Roger and Stone (2004).

Inflation targeting countries that institutionalize a clear commitment to an inflation target are classified into the *full-fledged inflation targeting* regime (Bernanke and others, 1999; Schaechter, Stone and Zelmer, 2000; and Truman, 2003). The strong commitment to the inflation target of these countries leaves them less room for discretion vis-à-vis all the other regimes except for the nonautonomous regime countries. The starting date for the adoption of inflation targeting is the date at which a country is deemed to have had in place most of the elements of a full-fledged inflation targeting framework (Schaechter, Stone and Zelmer, 2000; Roger and Stone, 2004). Full-fledged inflation targeting was employed by twenty countries in 2003.

The remaining central banks can be loosely described (not classified) as relatively opaque inflation anchor countries. Many have policy objectives other than inflation (Carare and Stone, 2003). The wide diversity of the countries in terms of size and level of development is a puzzle, since monetary regimes can be expected to be tailored to different economic circumstances.

This puzzle can be resolved by dividing these countries into two groups: one that has attained price stability, and one that has not. It turns out that monetary policy for these countries is qualitatively different.

A sensible way to define price stability is as the level and variability of inflation which best supports growth in the long run. Stanley Fischer took this sort of approach as a basis for his ideal long-run goal of monetary policy: inflation in the range of 1 to 3 percent (Fischer, 1996). Another cutoff point is provided by Sarel (1996), who concluded that the relationship

between inflation and growth turns from negative to positive below around 8 percent rate of inflation.

Price stability is quantified here as 10 years of average inflation below 4 percent. This is an arbitrary number but it does turn out that inflation for the relatively opaque inflation anchor countries tends to cluster above and below 4 percent. Ideally, the measure of price stability would encompass forward-looking inflation expectations as well as actual inflation from past years, but comparable cross-country measures of inflation expectations are not available.[8] Therefore inflation during t-9 to t was used to classify a country in year t on the grounds that price stability takes about that long to get entrenched. The use of five or seven year averages means that a few more countries are classified as attaining price stability in recent years owing to the worldwide decline in inflation.

The relatively opaque inflation anchor countries that maintain price stability are classified here as practicing an *implicit price stability anchor* (Mishkin, 2000). This sort of regime could also be called categorized as "covert" (Mankiw, 2002), "eclectic" (Carare and Stone, 2003), "just do it" (Mishkin, 1999), or "don't ask, don't tell" (Goodfriend, 2003) inflation targeting. These countries clearly adhere to a price stability objective, but because they do so with a low degree of clarity their commitment is implicit. There are differences in transparency across the implicit price stability anchor countries—for example, a few have quantitative one-sided inflation targets. But they have no explicit accountability modalities and are considerably less transparent than the full-fledged inflation targeting countries, and therefore practice a qualitatively different regime. Indeed, for them price stability is so solidly entrenched that price stability itself can be viewed as the nominal anchor, even if it not defined quantitatively defined. The relatively low degree of clarity gives them a high degree of discretion relative to the other regimes. The number of implicit price stability anchor countries was five in 2003.[9]

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[8] Two indicators other than past inflation could be used to determine whether a country has attained price stability. First, long-term local currency government debt ratings could be used in that they capture forward-looking credibility of government policies. Transforming the letter ratings into numbers and using them to classify relatively opaque inflation anchor countries generates the same two groupings as past inflation (Carare and Stone, 2003). Further, debt ratings generate more separation between the two groups because ratings are more evenly distributed across the countries compared to past inflation. A second indicator of price stability could be the variance of inflation. Again, inflation variance results in an almost identical split of the countries into two groups.

[9] The monetary policy regime in Japan in recent years is probably a special case. By the end of the 1990s. the Bank of Japan faced the challenge of ending deflation in the context of a large negative output gap while making sure that the ailing banking sector had sufficient liquidity. Against this background, the Bank of Japan in March 2001 committed itself to maintaining excess bank reserves and zero interest rates until the CPI, excluding fresh food, becomes stably flat or positive on a year-on-year basis (Bank of Japan website). Ingrained

The remaining countries are classified in an *inflation targeting lite* monetary regime. This regime covers a grab-bag of monetary frameworks with variable weights to inflation, exchange rate and monetary objectives and intermediate targets.[10] Given the absence of a single overarching anchor, it is not surprising that these countries report relatively low commitment and high discretion compared to the other regimes. The inflation targeting lite regime countries are qualitatively different from the implicit price stability anchor countries in that their policy implementation is much less forward-looking and market-oriented, and they intervene more in the foreign exchange market (Stone, 2003a). These differences reflect their multiplicity of policy objectives and less-developed financial markets. Inflation targeting lite can be viewed as a transitional monetary regime aiming at maintaining monetary stability until the implementation of structural reforms in support of a single nominal anchor.[11] In 2003, 20 countries were practicing inflation targeting lite.

IV. INDICATORS OF MONETARY POLICY

This section compares key indicators of monetary policy across the monetary regimes to gauge whether the taxonomy proposed in the previous section captures meaningful differences in monetary policy across countries. Indicators of central bank commitment and discretion and inflation and exchange rate data indicate that there are indeed systematic differences across the regimes.

Commitment and discretion across the regimes

The monetary regimes defined in this paper are consistent with differences in self-reported central bank commitment and discretion. Indicators of commitment and discretion are from the central bank survey reported in Fry and others (2000; Table A.1) which was collected from central banks in 1999 (data are not available for some of the countries). The indicators are valued from 0 to 100 with 100 denoting the strongest commitment or the most discretion.

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deflation means that a one-sided inflation commitment will not threaten price stability and therefore that monetary policy can have extra discretion to deal with financial stability. Nevertheless, Japan during the years 2001-03 is folded into the implicit price stability anchor classification, since an "anti-deflation" regime applies to only one country for several years.

[10] Thirteen of the 20 countries that could be classified as inflation targeting lite in 2001 announced some sort of inflation objective or forecast but they did not adhere to an explicit and dominant inflation target (Stone, 2003a).

[11] The inflation targeting lite regime has much in common with the managed floating plus exchange rate regime proposed by Goldstein (2002) for open emerging economies where "plus" is shorthand for a framework that includes inflation targeting and aggressive measures to discourage currency balance sheet mismatching.

The levels of self-reported commitment to an exchange rate, inflation anchor is in accord with the monetary regime classifications (figures for the money anchor regimes are not reported because only one country was practicing this regime in 1999) (Table 2). Countries classified as practicing monetary nonautonomy report the highest commitment and the lowest discretion, while weak anchor and implicit price stability anchor countries report the highest discretion and the lowest commitment. The relatively high levels of discretion self-reported by the exchange rate anchor countries are rather surprising and could reflect the regular adjustment of their exchange rate targets. The commitment to an inflation target is strongest by far for the full-fledged inflation targeting countries and weakest for the nonautonomous and exchange rate countries, which is again consistent with the regime definitions.

Inflation and exchange rate changes across the regimes

Inflation rates vary systematically across the regimes in accordance with the degree of commitment to a nominal anchor. Figure 3a shows annual CPI inflation rates during the period 1990-2003 for all but the weak anchor regimes; the latter are excluded to facilitate comparisons between the other regimes. The implicit price stability anchor countries, by definition, have the lowest inflation and the strong-commitment full-fledged inflation targeting countries have the next lowest. Money anchor countries, most of which were advanced countries, show fairly low inflation. The nonautonomous countries generally have single digit inflation rates although there are some relatively high rates at the beginning of several CBA regimes which brought undervalued real exchange rates back to equilibrium. The surprisingly high inflation for the exchange rate peg countries reflects the movable targets for many of them. Finally, the inflation targeting lite countries have a wide dispersal of inflation in accordance with their relatively weak commitment.

Interestingly, the distributions of annual changes in exchange rates vis-à-vis the U.S. dollar do not vary across regimes by as much as the inflation rates (Figure 3b). The lack of variance across regimes is especially striking because the use of U.S. dollar exchange rate to gauge exchange rate movements overstates differences between regimes, since many countries employ an exchange rate guide based on currencies other than the dollar. Of course, a more rigorous measure of the exchange rate as a monetary objective would need to account for movement in international reserves. Still, in general, inflation seems to be a better guide for differences between monetary regimes than exchange rate movements.

V. MONETARY REGIME TRENDS

The international profile of monetary regimes changed significantly during the last decade and a half (Figure 2). The number of countries with a nonautonomous monetary regime more than doubled, as five transition and Latin American countries adopted this regime prompted in most cases by price instability. The number of weak anchor countries fell from 13 to 0, in line with the worldwide decline in inflation. The share of countries with an exchange rate peg decreased from one-half to one-quarter of the total at the same time as the share of full-

fledged inflation targeters rose from almost nil to one-quarter. There were also important differences in the composition of regimes between advanced and emerging market countries.

Almost all the advanced countries now use a full-fledged inflation target or implicit price stability nominal anchor (Figure 4). In 1990 two-thirds of advanced countries adhered to an exchange rate peg, while by 2003 most practiced full-fledged inflation targeting. All of the remaining countries, except for one (Denmark), used an implicit price stability anchor. Thus the main issue with respect to monetary regimes for advanced countries is not the choice of anchor but the degree of clarity of the anchor.

Emerging market countries have moved to a wider array of regimes probably reflecting their more diverse history and economic structure (Figure 5). In 1990 about half of emerging market countries had an exchange rate peg and one-quarter had a weak anchor. In 2003 they used a wider array of regimes: exchange rate pegs and inflation targeting lite regimes each had a share of about one-third, with the rest split about evenly between nonautonomous and full-fledged inflation targeting systems. The more diffuse profile for monetary regimes for emerging market countries suggests that relatively small differences in economic circumstances can lead countries to adopt quite different monetary regimes.

These changes in monetary regimes can also be viewed in terms of shifts in the discretion of monetary policy. A summary time series measure of discretion for all the countries can be constructed as follows:

1) quantifying discretion for each regime by taking the within-regime average of discretion from the third column of Table 2,
2) using this measure of discretion as weights in a weighted average of the number of countries practicing each regime for each year from 1990-2003, and
3) constructing a time series from the annual weighted averages.

This summary measure of discretion fell for both advanced and emerging market countries during the period 1990-2003 (Figure 6). The trend toward less discretion in monetary policy took place at the same time as globalization took hold and inflation declined around the world (Rogoff, 2004). Of course the decline in inflation was largely due to factors exogenous to monetary policy, such as improved worldwide productivity, and cannot be attributed to a change in monetary regimes. The coincident decline in discretion, however, is striking and warrants further analysis.

Perhaps surprisingly, advanced countries seem to prefer less discretion than the emerging market countries. In 2003 most advanced countries had the economic structure and the tools for transparency and accountability to credibly commit to the low-discretion full-fledged inflation targeting regime. One-third of emerging market countries practiced the high-discretion inflation targeting lite regime, while another one-third applied an exchange rate peg which is a medium-discretion regime, giving these countries on balance higher discretion than the advanced countries.

VI. CHOICE OF MONETARY REGIME

This section examines how countries choose their monetary regime. Countries are assumed to choose the monetary regime that best fosters high and stable economic growth conditional on their own circumstances. Monetary policy can help support high economic growth in the first instance by maintaining price stability. In addition, a monetary regime with discretion allows the central bank to maintain stable growth by smoothing output shocks, and by using financial stability policies to forestall or deal with a systemic crisis that could impact the real sector.

The monetary regime choice process is presented here as a decision tree of binary decisions.[12] The decision tree is meant to capture how countries can think about switching to a new regime conditional on their circumstances. The decision tree makes the point that only a few choices are relevant for a given country. This point may seem obvious, but in practice policy discussions often get sidetracked into consideration of regimes that the international experience suggests are not germane to the country at hand.

First node: monetary autonomy

The first logical decision to be made in choosing a monetary regime is whether or not to have an independent national currency, that is, monetary autonomy. The fundamental prerequisite for monetary autonomy is an infrastructure for maintaining an independent currency, including monetary instruments and the personnel and expertise for active involvement with financial markets (Berg and Borensztein, 2000; Baliño and Enoch, 1997). A disproportionate number of small and developing countries have a nonautonomous regime because they do not have the infrastructure for an independent currency. The larger, developed countries that are the main subject of the analysis in this paper can be presumed to have the requisite infrastructure for monetary autonomy.

Given an infrastructure sufficient for monetary autonomy, the country can consider whether this regime best supports high and stable economic growth. The main disadvantage of nonautonomy is that monetary policy has no discretion. Therefore monetary policy cannot be used to stabilize output in the short run and has less scope for dealing with financial instability—although under a CBA, arrangements can be made for the limited issue of money to provide liquidity financing to distressed banks.

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[12] Other useful decision trees can be formulated based on the taxonomy of regimes proposed here. For example, an alternative tree would have autonomy versus nonautonomy as the first node, then an exchange rate target versus inflation target as the second node, with the inflation rate choice dividing into three further branches. The decision tree presumed here seems to match up with how countries actually think through regime switches.

The main advantage of the nonautonomous regime is that it can be used as a means of gaining credibility for countries with a record of monetary instability.[13] A forced exit from a nonautonomous regime due to monetary instability is expensive and risky, not least because the new currency would almost certainly be viewed as weaker than the one it replaced. At the same time, this irreversibility is a strong point because it locks in (in the absence of fiscal dominance) a regime with an international historical record of strong price stability. These considerations suggest that the choice of autonomy or nonautonomy is shaped by a record of price instability and vulnerability to shocks.

The empirical analysis of the first node choice is different from that of the other nodes owing to the high cost of exiting a nonautonomous regime. This high cost means that the odds of switching out of this regime are lower than that of switching out of the other regimes (Bubula and Otker-Robe, 2002). Thus, even if the structure of nonautonomous countries evolves from that which led them to this regime in the first place, nonautonomy typically remains the optimal choice owing to the high costs of exiting.

Thus, for empirical analysis, what seems to matter for choosing nonautonomy are the circumstances of the country *at the time of the adoption of this regime,* rather than at any given date after its adoption. This distinction can be seen by comparing Tables 4 and 5.

The most recently available observations of the standard indicators of economic structure cannot distinguish between nonautonomous and autonomous regime countries, despite the fundamental difference between these regimes. Table 4 reports the non-parametric Kolmogorov-Smirnov test of whether the standard monetary regime indicators for recent years differ significantly for nonautonomous countries as for countries with autonomous monetary regimes.[14] The null hypothesis for this test is that the distributions of the structural indicators for the countries in the two regimes are the same. The total number of nonautonomous monetary regime countries is only nine, and since data are not available for several of these countries, the KS test cannot be applied to some of the standard indicators. The KS statistics for the 2001 data all reject the null hypothesis that the indicators are similar across nonautonomous and autonomous regime countries (p-values less than 0.05).

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[13] There are other factors bearing on the autonomy choice. The absence of an autonomous national currency can be seen as a loss of national pride. Under NSLT, seignorage is foregone and the financial stability capacity of the central bank is highly limited. In particular, there is less scope for implementation of the lender-of-last-resort function. Finally, an advantage of nonautonomy is the lower transactions costs in trading with the country to which the local currency is tied.

[14] The advantage of a non-parametric test is that it requires no assumption on how the data are distributed, but its disadvantage is that it has lower power than parametric tests.

Comparing indicators in the year in which each nonautonomous country gave up its autonomy tells a different story: that price and exchange rate stability are markedly different between nonautonomous regime countries and other countries. Table 5 reports indicator values for each nonautonomous country at the year that they adopted their regime compared with the mean and distribution of the other countries. Excluded from the comparisons are three of the nonautonomous regime countries (Brunei Darussalam, Gabon, Panama), because data are not available for the year that they adopted nonautonomy. The median percentile ranking of inflation and depreciation for nonautonomous countries is 99 and 98 percent respectively. This suggests that nonautonomous regimes are typically adopted to rapidly bring down extremely high rates of inflation and currency depreciation. Indicators of size, openness, and economic and financial development are only marginally different between the nonautonomous and autonomous countries.

In sum, extreme price instability is the biggest motivator for the adoption of nonautonomy. The high cost of price and exchange rate instability helps explain why these countries are willing to give up all the benefits of an independent monetary policy. The deeper political and social factors underlying the occurrence of price and exchange rate instability are beyond the scope of this paper. The corollary to the determining role of price and exchange rate instability is that the structural indicators have little empirical relevance for the choice of nonautonomy.

Second node: inflation targeting lite or strong nominal anchor

An inflation targeting lite regime is viewed here as the alternative to an exchange rate peg or a full-fledged inflation targeting or an implicit price stability anchor. These latter three regimes are referred to collectively as a "strong anchor regime" for ease of exposition. Countries are presumed to first decide whether they can meet the preconditions for a strong anchor regime because they have a better price stability record and price stability is good for economic growth. Thus, the choice between inflation targeting lite and a strong anchor regime boils down to whether the country has the credibility to commit to a strong anchor.

Looking at differences across key indicators for inflation targeting lite and strong anchor regime countries is one way to examine this choice. KS statistics suggest that, first, inflation targeting lite countries are less developed, as indicated by their lower GDP per capita (Table 4). Second, the inflation targeting lite countries seem more vulnerable to external shocks, as evidenced by their higher dollarization and larger terms of trade shocks. Third, they have a poorer inflation record. Finally, the inflation targeting lite countries are rather less financially developed.

Binomial regressions tell a similar story to the descriptive statistics (first three columns of Table 6). The dependent variable is one for the inflation targeting lite countries and zero for the strong anchor regime countries. The regressions are cross-sectional rather than panel because cross-country variance dominates movement in the data. The candidate indicators are listed in the data appendix and are drawn from the empirical exchange rate (e.g., Juhn and Mauro, 2002) and inflation targeting (e.g., Mishkin and Schmidt-Hebbel, 2001 and Carare

and Stone, 2003) literatures. The specification strategy is to begin with the indicators that have relatively high univariate correlations with the dependent variable and report those that contributed to the predictive power of the regressions.

The results suggest that the strong anchor regime countries are larger, more developed, and have low inflation. Per capita GDP in U.S. dollars enters significantly in the regressions. Not surprisingly, the strong anchor regime countries have a better record of price stability than the inflation targeting lite countries. Terms of trade volatility, which measures the incidence and size of real shocks, is marginally significant. Interestingly, fiscal indicators do not show up as significant.

Third node: exchange rate or strong inflation anchor

Countries that have monetary autonomy and do not choose an inflation targeting lite regime must choose between an exchange rate peg, full-fledged inflation target or implicit price stability anchor. Countries that use these latter two regimes are called "strong inflation anchor" countries. Capital account openness has traditionally been seen as the first issue in choosing an exchange rate peg as more open countries will be more susceptible to speculative exchange rate attacks. More recently attention has been directed to balance sheet exposure to exchange rate and liquidity risk that raises the cost of defending an exchange rate peg. Countries with an open capital account and balance sheet exposure will tend not to adopt an exchange rate peg.

Countries with a relatively closed capital account will compare the implications of exchange rate and strong inflation anchors for high and stable economic growth and consider whether their economic history and economic structure can support a credible commitment to these anchors. Both exchange rate and strong inflation anchors are consistent with relatively low inflation. With respect to short-term output stability the choice will reflect the nature of shocks to which the country is vulnerable, which has been the focus of the exchange rate regime literature beginning with Mundell (1961). Countries with a large share of GDP accounted for by trade denominated in a foreign currency may find it advantageous to anchor monetary policy to that currency to smooth growth.

The KS tests provide some evidence on the structural differences between exchange rate peg and strong inflation anchor countries. As expected, the exchange rate peg countries have a relatively closed capital account. At the same time they are more dollarized and have more open trade accounts, which would increase their vulnerability to exchange rate fluctuations. The large size, higher per capita GDP, and deeper financial sectors of the strong inflation anchor countries are suggestive about what it takes to make a credible commitment to an inflation target.

Regression results (last four columns of Table 6) suggest that strong inflation anchor countries are more developed and have a lower inflation record vis-à-vis the fixed exchange rate countries. The most robust variable is GDP. In addition, dollarization is important and suggests that a higher degree of dollarization is associated with a higher probability of

observing a fixed exchange rate regime. Surprisingly, the measure of capital account openness does not impact the results significantly, nor does the currency crisis indicator, or the fiscal balance.

Node four: full-fledged inflation targeting or implicit price stability anchor

The final choice is between an implicit price stability anchor and full-fledged inflation targeting anchor. Presumably, implicit price stability anchor countries are not explicit in their commitment to inflation because this would reduce their flexibility with respect to other objectives, such as output stability, without an offsetting gain in price stability (Jensen, 2001). Since implicit price stability anchor central banks have the best of both worlds—price stability and discretion—it can be presumed that a strong inflation target anchor country would choose this implicit price stability anchor if it could credibly do so.

Descriptive statistics hint at the structural characteristics that allow the implicit price stability anchor countries to have both low and stable inflation and policy discretion. The number of implicit price stability anchor and full-fledged inflation targeting countries is too few for statistical inference using KS statistics or regressions. However, summary statistics suggest that implicit price stability anchor countries are larger and more developed compared to full-fledged inflation targeting countries (Table 3). Further, implicit price stability anchor countries have more developed financial systems. The financial systems of implicit price stability anchor countries are not just deeper, as evidenced by money to GDP and stock market capitalization to GDP ratios, but are also more active, as gauged by stock market trading activity. The more dynamic financial sectors of the implicit price stability anchor countries may provide economies of scale and financial incentives for market-based central bank watchers to informally hold the central bank accountable. In contrast, the shallower markets of full-fledged inflation targeting countries necessitate formal accountability (Goodfriend, 2003; Stone, 2003b).

VII. CONCLUSION

The taxonomy of monetary regimes put forth in this paper is motivated by the lack of a practical menu of regime choices for policymakers that provides a complete assessment of commitment versus discretion. Monetary regimes are defined here by the choice and clarity of the nominal anchor. This definition leads naturally to seven all-inclusive monetary regimes that capture the varying commitment-discretion tradeoffs that are at the heart of choosing a regime. The empirical analysis based on this taxonomy provides some evidence on the structural and historical circumstances upon which countries condition their regime choice.

The main policy implications of this paper pertain to the tradeoffs posed by regime switches and refine their monetary regime. A switch has to be considered in terms of the potential costs and benefits that can be viewed largely in terms of commitment versus discretion tradeoffs. The adoption of an inflation anchor by nearly all advanced countries makes the

point that the main issue for them is not the choice of an anchor, but rather the optimal degree of clarity. The more diffuse regime profile for emerging market countries suggests that relatively small differences in economic circumstances can lead to the adoption of quite different monetary regimes.

The taxonomy proposed in this paper raises further research topics. The econometric analysis of this paper will be extended to explicitly test the hypothesis that regime choice can be described by a decision tree. The relationship between financial instability and regime choice is another important research area given the social cost of financial crises and the links between monetary regimes and crisis. Further, the taxonomy of monetary regimes may be able to contribute to understanding of how economic policies help shape economic growth.

Finally, the taxonomy proposed here may help anticipate the emergence of new monetary regimes. Today several of the implicit price stability anchor countries are enhancing their commitment to the inflation target in ways that make them look more like full-fledged inflation targeters (Stone, 2003b). At the same time, the locking in of a high degree of credibility by full-fledged inflation targeting countries may give them room to ease their commitment to the inflation target and thus give them more discretion to pursue output and financial stability (Debelle, 2003). Thus, a new monetary regime lying halfway on the clarity continuum between an implicit price stability anchor and full-fledged inflation targeting may be in the works. The emergence of this new regime serves as an example of how over time the operative taxonomy of monetary regimes will need to be altered to take into account the natural creation and destruction of regimes in response to changing economic circumstances.

Table 1. Overview of Monetary Regimes

Monetary Regime	Anchor	Clarity
Monetary nonautonomy	Currency of another country	High
Weak anchor	None	Not applicable
Money anchor	Money aggregate	Medium
Exchange rate peg	Exchange rate	High
Full-fledged inflation targeting	Inflation target	High
Implicit price stability anchor	Price stability	Low to medium
Inflation targeting lite	Broad inflation objective	Low

Table 2. Central Bank Self-Reported Commitment and Discretion 1/

	Exchange Rate Commitment	Inflation Commitment	Discretion
Monetary nonautonomy (5)			
Average	100.0	0.0	0.0
Median	100.0	0.0	0.0
Weak anchor (4)			
Average	23.5	42.3	60.5
Median	25.0	41.0	55.0
Exchange rate peg (12)			
Average	66.8	20.4	36.4
Median	75.0	13.0	37.5
Full-fledged inflation targeting (9)			
Average	10.4	93.3	12.1
Median	6.0	94.0	9.0
Implicit price stability anchor (4)			
Average	31.3	22.0	54.5
Median	28.0	19.0	51.5
Inflation targeting lite (17)			
Average	22.6	48.4	51.5
Median	13.0	44.0	47.0

1/ Number of reporting countries in each regime in parentheses.

Source: Fry and others, 2000.

Table 3. Monetary Regimes, Descriptive Statistics

	Nonautonomous		Inflation Targeting Lite		Fixed Exchange Rate		Full-Fledged Inflation Targeting		Implicit price stability anchor	
	Average	Median	Average	Median	Average	Median	Average	Median	Average	Median
Size and level of development										
GDP, $ billions	56.9	11.0	51.4	21.1	62.6	13.6	200.6	129.3	3235.2	2697.4
GDP per capita, $000	7637	3539	2609	1698	6900	3197	11455	4587	26463	24337
External										
Capital account openness	0.5	0.21	0.19	0.15	0.77	0.20	0.59	0.38	1.56	1.59
Terms of trade volatility	1.2	0.89	14.8	0.91	1.91	0.55	0.26	0.18	0.1	0.08
Financial										
Currency crisis			4.94	3.0	2.56	1.0	3.88	2	0.000	0.000
Dollarization	36	41	35.600	31.6	27.9	19.4	10.200	3.5	3.540	0.1
Broad money to GDP	0.73	31	0.40	0.36	0.680	0.62	0.550	0.54	0.90	0.92
Stock market capitalization to GDP	0.75	36	0.13	0.10	0.34	0.16	0.47	0.38	1.22	1.29
Inflation										
Inflation, 1996-2000	277	13.9	131.9	27.5	12.8	7.0	63.5	9.9	2.5	2.3
Institutional										
Political freedom	0.4	1.0	-0.1	-0.08	0.41	0.48	0.610	0.74	1.27	1.19
Openness	1.14	0.96	0.73	0.57	0.850	0.78	0.610	0.65	0.97	0.60

Sources: See Appendix III.

Table 4. Monetary Regimes, Kolmogorov-Smirnov Statistics 1/

	Nonautonomous versus Autonomous		Inflation targeting lite versus strong anchor regime		Exchange rate peg versus strong inflation anchor	
Size and level of development	KS stat.	P value	KS stat.	P value	KS stat.	P value
GDP, $000,000,000	0.42	0.10	0.36	0.05	0.65	0.00
GDP per capita, $000	0.26	0.60	0.46	0.00	0.42	0.02
External						
Capital account openness	...	...	0.52	0.00	0.47	0.01
Terms of trade volatility	...	...	0.44	0.01	0.47	0.01
Openness	0.32	0.33	0.16	0.86	0.39	0.04
Financial						
Currency crisis	...	...	0.20	0.58	0.10	1.00
Dollarization	...	...	0.44	0.01	0.47	0.01
Stock market capitalization to GDP	0.25	0.65	...	...	...	...
Money to GDP	0.45	0.06	0.51	0.00	0.15	0.92
Inflation						
Inflation, 1996-2000	0.37	0.18	0.64	0.00	0.19	0.73
Real shocks						
Output gap volatility	...	...	0.33	0.07	0.38	0.04
Cumulative general government balance	...	...	0.19	0.66	0.25	0.44
Institutional						
Political freedom	0.22	0.78	0.42	0.01	0.42	0.02

1/ The Kolmogorov-Smirnov statistic is used to test whether two data samples are compatible with being random samplings of the same unknown distribution. The null hypothesis is that the two samples come from the same distribution. Therefore, a low p-statistic suggests that the key indicators for countries in the two regime groupings come from two different distributions.

Table 5. Nonautonomous Regime Countries, Indicators at the Year of the Adoption of Nonautonomy

Inflation (three-year average)

	Country	World Median	World Percentile
Hong Kong SAR (1983)	12.3	8.0	0.73
Argentina (1991)	1477.1	9.3	0.99
Estonia (1992)	326.4	6.5	0.95
Lithuania (1994)	280.2	7.6	0.97
Bulgaria (1997)	334.5	4.3	0.99
Ecuador (2000)	53.8	3.1	0.99
Median			0.98

Currency Depreciation (three-year average)

	Country	World Median	World Percentile
Hong Kong SAR (1983)	8.7	7.2	0.53
Argentina (1991)	78.5	3.8	0.98
Estonia (1992)	37.4	3.6	0.85
Lithuania (1994)	54.3	0.7	0.97
Bulgaria (1997)	55.0	8.8	0.99
Ecuador (2000)	38.4	7.5	0.99
Median			0.97

GDP ($Billions)

	Country	World Median	World Percentile
Hong Kong SAR (1983)	29.4	29.7	0.49
Argentina (1991)	189.6	47.3	0.74
Estonia (1992)	1.0	49.2	0.01
Lithuania (1994)	4.3	55.6	0.07
Bulgaria (1997)	10.4	81.3	0.18
Ecuador (2000)	15.9	84.0	0.20
Median			0.19

Per capita GDP ($000)

	Country	World Median	World Percentile
Hong Kong SAR (1983)	5492	2413	0.66
Argentina (1991)	5751	3322	0.57
Estonia (1992)	603	2920	0.16
Lithuania (1994)	1128	3239	0.22
Bulgaria (1997)	1161	4290	0.17
Ecuador (2000)	1228	4123	0.19
Median			0.21

M3 to GDP

	Country	World Median	World Percentile
Hong Kong SAR (1983)	181.7	51.3	0.90
Argentina (1991)	10.6	55.2	0.01
Estonia (1992)	31.3	56.6	0.16
Lithuania (1994)	25.8	56.7	0.12
Bulgaria (1997)	32.5	55.4	0.20
Ecuador (2000)	31.3	62.1	0.16
Median			0.16

Trade Flows to GDP

	Country	World Median	World Percentile
Hong Kong SAR (1983)	193.6	64.2	0.94
Argentina (1991)	13.8	65.3	0.01
Estonia (1992)	114.6	67.9	0.76
Lithuania (1994)	116.8	72.0	0.78
Bulgaria (1997)	118.3	74.6	0.76
Ecuador (2000)	73.2	79.5	0.42
Median			0.76

Sources: See Appendix III

Table 6. Monetary Regime Binomial Probit Regression Results

	Inflation targeting lite and strong anchor regime (Dependent variable =1 for inflation targeting lite, 0 otherwise)			Exchange rate peg and strong inflation anchor (Dependent variable =1 for exchange rate peg, 0 otherwise)			
Constant	5.5	5.9	6.6	2.6	2.6	2.7	2.6
	(1.5)	(1.6)	(1.7)	(2.7)	(2.7)	(2.6)	(2.7)
Log of per capita $GDP	-1.1	-1.1	-1.2				
	(2.3)	(2.3)	(2.3)				
Log of $GDP				-0.5	-0.5	-0.5	-0.5
				(2.9)	(3.0)	(2.9)	(2.6)
Lagged inflation	0.9	0.9	1.0	-0.8	-0.8	-0.8	-0.8
	(2.8)	(2.9)	(2.6)	(2.0)	(2.0)	(2.0)	(2.0)
Lagged terms of trade	0.5	0.5	0.6				
	(1.9)	(1.9)	(2.0)				
Cumulative gov. deficit		0.0				0.0	
		(0.7)				-0.6	
Dollarization			-0.1	0.1	0.1	0.1	0.1
			(0.9)	(1.9)	(1.8)	(1.8)	(1.9)
Capital openness						-0.1	
						(0.4)	
Stock market cap to GDP							0.0
							(0.2)
LLR	-22.2	-22.0	-19.8	-13.7	-13.6	-13.7	-13.7
AIC	52.5	53.9	49.6	35.5	37.1	37.4	37.4
Chi Squ (X) X=number of explanatory variables	3.37 (0.00)	3.94 (0.00)	3.00 (0.00)	9.35 (0.00)	9.70 (0.00)	9.47 (0.00)	9.39 (0.00)
No. of observations	64	64	59	41	41	41	41
Hits Ratio 1/	0.78	0.78	0.80	0.88	0.88	0.88	0.88

1/ Percentage of observations in each regime with estimated probability greater than 0.5.

MONETARY REGIME CLASSIFICATIONS, LARGER AND MORE DEVELOPED COUNTRIES, 1990–2003

Key:
NnAt—Monetary nonautonomy
WkAn—Weak anchor
MonA—Money anchor
XRP—Exchange rate peg
FFIT—Full-fledged infl targeting
IIT—Implicit price stability anchor
ITL—Inflation targeting lite
N/A—No data
Euro—Adopted euro

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Albania	N/A	N/A	WkAn	WkAn	ITL	ITL	ITL	ITL	ITL	ITL	ITL	ITL	ITL	ITL
Algeria	XRP	XRP	XRP	XRP	ITL	ITL	ITL	ITL	ITL	ITL	ITL	ITL	ITL	ITL
Argentina	WkAn	WkAn	NnAt	NnAt	NnAt	NnAt	NnAt	NnAt	NnAt	NnAt	NnAt	NnAt	NnAt	NnAt
Australia	ITL	ITL	ITL	FFIT	FFIT	FFIT	FFIT	FFIT	FFIT	FFIT	FFIT	FFIT	FFIT	FFIT
Austria	XRP	XRP	XRP	XRP	XRP	XRP	XRP	XRP	XRP	Euro	Euro	Euro	Euro	Euro
Bahamas	XRP	XRP	XRP	XRP	XRP	XRP	XRP	XRP	XRP	XRP	XRP	XRP	XRP	XRP
Bahrain	XRP	XRP	XRP	XRP	XRP	XRP	XRP	XRP	XRP	XRP	XRP	XRP	XRP	XRP
Belgium	XRP	XRP	XRP	XRP	XRP	XRP	XRP	XRP	XRP	Euro	Euro	Euro	Euro	Euro
Bolivia	ITL	ITL	ITL	ITL	ITL	ITL	ITL	ITL	ITL	XRP	XRP	XRP	XRP	XRP
Botswana	XRP	XRP	XRP	XRP	XRP	XRP	XRP	XRP	XRP	XRP	XRP	XRP	XRP	XRP
Brazil	WkAn	WkAn	WkAn	WkAn	WkAn	WkAn	WkAn	ITL	ITL	FFIT	FFIT	FFIT	FFIT	FFIT
Brunei	NnAt	NnAt	NnAt	NnAt	NnAt	NnAt	NnAt	NnAt	NnAt	NnAt	NnAt	NnAt	NnAt	NnAt
Bulgaria	WkAn	WkAn	WkAn	WkAn	WkAn	WkAn	WkAn	NnAt	NnAt	NnAt	NnAt	NnAt	NnAt	NnAt
Canada	ITL	FFIT	FFIT	FFIT	FFIT	FFIT	FFIT	FFIT	FFIT	FFIT	FFIT	FFIT	FFIT	FFIT
Chile	ITL	ITL	ITL	ITL	ITL	ITL	ITL	ITL	XRP	FFIT	FFIT	FFIT	FFIT	FFIT
China	XRP	ITL	ITL	ITL	ITL	XRP	XRP	XRP	XRP	XRP	XRP	XRP	XRP	XRP
China, SAR	NnAt	NnAt	NnAt	NnAt	NnAt	NnAt	NnAt	NnAt	NnAt	NnAt	NnAt	NnAt	NnAt	NnAt
Colombia	ITL	XRP	XRP	XRP	XRP	XRP	XRP	XRP	XRP	ITL	ITL	FFIT	FFIT	FFIT
Costa Rica	ITL	ITL	ITL	ITL	ITL	ITL	XRP	XRP	ITL	ITL	ITL	ITL	XRP	XRP
Croatia	WkAn	WkAn	WkAn	WkAn	WkAn	XRP	XRP	XRP	XRP	ITL	ITL	ITL	ITL	ITL
Cyprus	XRP	XRP	XRP	XRP	XRP	XRP	XRP	XRP	XRP	XRP	XRP	XRP	XRP	XRP
Czech Repub.	N/A	N/A	XRP	XRP	XRP	XRP	XRP	ITL	FFIT	FFIT	FFIT	FFIT	FFIT	FFIT
Czechoslovakia	XRP	XRP	XRP	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Denmark	XRP	XRP	XRP	XRP	XRP	XRP	XRP	XRP	XRP	XRP	XRP	XRP	XRP	XRP
Dom Rep	WkAn	WkAn	ITL	ITL	ITL	ITL	ITL	ITL	ITL	ITL	ITL	ITL	ITL	ITL
Ecuador	WkAn	WkAn	WkAn	WkAn	XRP	XRP	XRP	XRP	XRP	WkAn	WkAn	NnAt	NnAt	NnAt
Egypt	XRP	XRP	XRP	XRP	XRP	XRP	XRP	XRP	XRP	ITL	ITL	XRP	XRP	ITL
El Salvador	ITL	ITL	ITL	XRP	XRP	XRP	XRP	XRP	XRP	XRP	XRP	NnAt	NnAt	NnAt
Estonia	N/A	N/A	NnAt	NnAt	NnAt	NnAt	NnAt	NnAt	NnAt	NnAt	NnAt	NnAt	NnAt	NnAt

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Euro Area	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	IIT	IIT	IIT	IIT	IIT
Finland	XRP	XRP	FFIT	FFIT	FFIT	FFIT	FFIT	FFIT	FFIT	Euro	Euro	Euro	Euro	Euro
France	XRP	XRP	XRP	XRP	XRP	XRP	XRP	XRP	XRP	Euro	Euro	Euro	Euro	Euro
Gabon	NnAt	NnAt	NnAt	NnAt	NnAt	NnAt	NnAt	NnAt	NnAt	NnAt	NnAt	NnAt	NnAt	NnAt
Germany	XRP	XRP	XRP	XRP	XRP	XRP	XRP	XRP	XRP	Euro	Euro	Euro	Euro	Euro
Guatemala	WkAn	ITL	ITL	MonA	MonA	MonA	ITL	ITL	ITL	ITL	ITL	ITL	ITL	ITL
Greece	XRP	XRP	XRP	XRP	XRP	XRP	XRP	XRP	XRP	XRP	XRP	Euro	Euro	Euro
Honduras	XRP	XRP	ITL	ITL	ITL	XRP	XRP	XRP	XRP	XRP	XRP	XRP	XRP	XRP
Hungary	XRP	XRP	XRP	XRP	XRP	XRP	XRP	XRP	XRP	ITL	FFIT	FFIT	FFIT	FFIT
Iceland	XRP	XRP	XRP	XRP	XRP	XRP	XRP	XRP	XRP	XRP	XRP	FFIT	FFIT	FFIT
Indonesia	ITL	ITL	ITL	ITL	ITL	ITL	ITL	ITL	ITL	ITL	ITL	ITL	ITL	ITL
Iran, I.R. of	XRP	XRP	XRP	XRP	XRP	WkAn	XRP	XRP	XRP	XRP	XRP	XRP	ITL	ITL
Ireland	XRP	XRP	XRP	XRP	XRP	XRP	XRP	XRP	XRP	Euro	Euro	Euro	Euro	Euro
Israel	XRP	XRP	XRP	XRP	XRP	MonA	XRP	XRP	FFIT	FFIT	FFIT	FFIT	FFIT	FFIT
Italy	XRP	XRP	XRP	MonA	MonA	MonA	XRP	XRP	XRP	Euro	Euro	Euro	Euro	Euro
Jamaica	ITL	ITL	XRP	ITL	ITL	ITL	ITL	ITL	ITL	ITL	ITL	ITL	ITL	ITL
Japan	IIT	IIT	IIT	IIT	IIT	IIT	IIT	IIT	IIT	IIT	IIT	IIT	IIT	IIT
Jordan	XRP	XRP	XRP	XRP	XRP	XRP	XRP	XRP	XRP	XRP	XRP	XRP	XRP	XRP
Kazakhstan	N/A	N/A	N/A	MonA	MonA	MonA	MonA	ITL	ITL	ITL	ITL	ITL	ITL	ITL
Korea	MonA	MonA	MonA	MonA	MonA	MonA	MonA	ITL	ITL	ITL	ITL	FFIT	FFIT	FFIT
Kuwait	XRP	XRP	XRP	XRP	XRP	XRP	XRP	XRP	XRP	XRP	XRP	XRP	XRP	XRP
Latvia	N/A	N/A	WkAn	WkAn	XRP	XRP	XRP	XRP	XRP	XRP	XRP	XRP	XRP	XRP
Lebanon	WkAn	WkAn	WkAn	XRP	XRP	XRP	XRP	XRP	XRP	XRP	XRP	XRP	XRP	XRP
Libya	N/A	N/A	N/A	XRP	XRP	XRP	XRP	XRP	XRP	XRP	XRP	XRP	XRP	XRP
Lithuania	N/A	N/A	N/A	WkAn	WkAn	NnAt	NnAt	NnAt	NnAt	NnAt	NnAt	NnAt	NnAt	NnAt
Malaysia	IIT	IIT	IIT	IIT	IIT	IIT	IIT	IIT	XRP	XRP	XRP	XRP	XRP	XRP
Mauritius	XRP	XRP	XRP	XRP	ITL	ITL	ITL	ITL	ITL	ITL	ITL	ITL	ITL	ITL
Mexico	XRP	XRP	XRP	XRP	ITL	ITL	ITL	ITL	ITL	ITL	FFIT	FFIT	FFIT	FFIT
Morocco	XRP	XRP	XRP	XRP	XRP	XRP	XRP	XRP	XRP	XRP	XRP	XRP	XRP	XRP
Netherlands	XRP	XRP	XRP	XRP	XRP	XRP	XRP	XRP	XRP	Euro	Euro	Euro	Euro	Euro
New Zealand	FFIT	FFIT	FFIT	FFIT	FFIT	FFIT	FFIT	FFIT	FFIT	FFIT	FFIT	FFIT	FFIT	FFIT
Norway	XRP	XRP	ITL	ITL	ITL	ITL	IIT	IIT	IIT	IIT	IIT	FFIT	FFIT	FFIT
Oman	XRP	XRP	XRP	XRP	XRP	XRP	XRP	XRP	XRP	XRP	XRP	XRP	XRP	XRP
Panama	NnAt	NnAt	NnAt	NnAt	NnAt	NnAt	NnAt	NnAt	NnAt	NnAt	NnAt	NnAt	NnAt	NnAt
Peru	WkAn	WkAn	WkAn	WkAn	ITL	ITL	ITL	ITL	ITL	ITL	ITL	ITL	FFIT	FFIT

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Philippines	XRP	ITL	ITL	ITL	ITL	XRP	XRP	ITL	ITL	ITL	ITL	ITL	FFIT	FFIT
Poland	WkAn	WkAn	WkAn	XRP	XRP	XRP	XRP	XRP	XRP	FFIT	FFIT	FFIT	FFIT	FFIT
Portugal	XRP	XRP	XRP	XRP	XRP	XRP	XRP	XRP	XRP	Euro	Euro	Euro	Euro	Euro
Qatar	XRP	XRP	XRP	XRP	XRP	XRP	XRP	XRP	XRP	XRP	XRP	XRP	XRP	XRP
Romania	WkAn	WkAn	WkAn	WkAn	WkAn	ITL	ITL	WkAn	WkAn	WkAn	WkAn	ITL	ITL	ITL
Russia	N/A	N/A	WkAn	WkAn	WkAn	WkAn	XRP	WkAn	WkAn	WkAn	ITL	ITL	ITL	ITL
Saudi Arabia	XRP	XRP	XRP	XRP	XRP	XRP	XRP	XRP	XRP	XRP	XRP	XRP	XRP	XRP
Singapore	IIT	IIT	IIT	IIT	IIT	IIT	IIT	IIT	IIT	IIT	IIT	IIT	IIT	IIT
Slovak Rep	N/A	N/A	N/A	XRP	XRP	XRP	XRP	XRP	ITL	ITL	ITL	ITL	ITL	ITL
Slovenia	N/A	N/A	ITL	ITL	XRP	ITL	XRP	XRP	ITL	ITL	ITL	ITL	ITL	ITL
South Africa	MonA	MonA	MonA	MonA	MonA	MonA	MonA	ITL	ITL	ITL	FFIT	FFIT	FFIT	FFIT
Spain	XRP	XRP	XRP	XRP	XRP	FFIT	FFIT	FFIT	FFIT	Euro	Euro	Euro	Euro	Euro
Sri Lanka	ITL	ITL	ITL	ITL	ITL	ITL	ITL	ITL	ITL	ITL	ITL	ITL	ITL	ITL
Sweden	XRP	XRP	FFIT	FFIT	FFIT	FFIT	FFIT	FFIT	FFIT	FFIT	FFIT	FFIT	FFIT	FFIT
Switzerland	MonA	MonA	MonA	MonA	MonA	MonA	MonA	MonA	MonA	MonA	IIT	IIT	IIT	IIT
Syrian Arb Rep	XRP	XRP	XRP	XRP	XRP	XRP	XRP	XRP	XRP	XRP	XRP	XRP	XRP	XRP
Thailand	XRP	XRP	XRP	XRP	XRP	XRP	XRP	ITL	ITL	ITL	FFIT	FFIT	FFIT	FFIT
Turkey	WkAn	WkAn	WkAn	WkAn	WkAn	WkAn	WkAn	WkAn	WkAn	WkAn	WkAn	WkAn	WkAn	ITL
UAE	XRP	XRP	XRP	XRP	XRP	XRP	XRP	XRP	XRP	XRP	XRP	XRP	XRP	XRP
United Kingdm	XRP	XRP	FFIT	FFIT	FFIT	FFIT	FFIT	FFIT	FFIT	FFIT	FFIT	FFIT	FFIT	FFIT
United States	MonA	MonA	MonA	IIT	IIT	IIT	IIT	IIT	IIT	IIT	IIT	IIT	IIT	IIT
Uruguay	WkAn	WkAn	WkAn	WkAn	WkAn	WkAn	XRP	XRP	XRP	XRP	XRP	XRP	XRP	XRP
Venezuela	WkAn	ITL	ITL	ITL	WkAn	WkAn	WkAn	WkAn	XRP	XRP	XRP	XRP	XRP	XRP

CLASSIFICATION OF COUNTRIES INTO MONETARY REGIMES

Monetary nonautonomy regime—Countries with an exchange rate arrangement classified by the IMF as (i) no separate legal tender, (ii) currency board arrangement, or (iii) currency union. The sources are Bubula and Otker-Robe (2002) for 1990-2001, and the *Exchange Arrangements and Exchange Restrictions* report of IMF for 2002 and 2003.

Weak nominal anchor regime—Countries in year t with an annual average CPI inflation rate exceeding 40 percent in year t are classified as having a weak nominal anchor regime. The sources are the *International Financial Statistics* and *World Economic Outlook* databases of the IMF.

Monetary anchor regime—Countries with a publicly announced monetary target and a floating exchange rate arrangement are classified as money anchor countries. For the exchange rate arrangements the sources are Bubula and Otker-Robe (2002) for 1990-2001, and the *Exchange Arrangements and Exchange Restrictions* report of IMF for 2002 and 2003. For the monetary target the source is Cottarelli and Giannini (1997, Table A) for 1990-94; Hviding (1999) for Switzerland 1995-98 and Krajnyak (2001) for Switzerland 1999; Jonsson (1999) for South Africa 1995-99; Bank of Korea (1997 and 1996) for Korea for 1995-96; Banca d'Italia (1998) for Italy 1995; IMF (1999) for Guatemala for 1995.

Exchange rate peg regime—Countries with an exchange rate arrangement classified by the IMF as: (i) conventional pegged arrangement, (ii) pegged exchange rate within horizontal band, or (iii) crawling peg. The sources are Bubula and Otker-Robe (2002) for 1990-2001, and the *Exchange Arrangements and Exchange Restrictions* report of IMF for 2002 and 2003.

Full-fledged inflation targeting regime—Countries with publicly announced inflation target "parameters" (e.g., quantitative inflation target inflation index, the target range or point, and the policy horizon), a public explanation of the principal monetary policy operations and the indicators that best reflect the stance of monetary policy, announcement and explanations of changes in the stance of monetary policy and their relation to inflation, and an ex-post assessment of the performance of monetary policy to allow the central bank to be held accountable. Sources are Schaechter, Stone and Zelmer (2000) and Roger and Stone (2004). Hungary (2000-03), Israel (1999-2003), and Poland (1999) had an exchange rate peg, horizontal band or crawl exchange rate arrangement but were classified as full-fledged inflation targeters as the inflation target is assumed to take precedence.

Implicit price stability anchor—Countries in t not included in any of the above regimes that have average inflation over t-9 to t of below 4 percent.

Inflation targeting lite regime—The remaining countries.

Correspondence between Monetary Regimes and IMF Exchange Rate Regimes

Monetary regimes	IMF official exchange rate regimes	Bubula and Otker-Robe exchange rate regimes
Monetary nonautonomy	↔ No separate legal tender	↔ Formal dollarization Currency union
	Currency board arrangement	↔ Currency board arrangements
Exchange rate peg	Conventional pegged arrangement	↔ Conventional fixed peg vis-à-vis a single currency Conventional fixed peg vis-à-vis a basket
	↔ Pegged exch. rate within horizontal band	↔ Horizontal band
	Crawling peg	↔ Crawling peg, forward looking Crawling peg, backward looking
Full-fledged inflation targeting Implicit price stability anchor Inflation targeting lite Money anchor Weak anchor	Crawling band	↔ Crawling band, forward looking Crawling band, backward looking
	↔ Managed floating	↔ Tightly managed floating Other managed floating
	Independently floating	↔ Independently floating

DATA DOCUMENTATION

Indicators	Period	Source	Notes
Level of development			
GDP (in billions USD)	Average, 1990-99	WEO	
GDP per capita (in 000's USD)	Average, 1990-99	WEO	
Trade flows (exports plus imports) to GDP	Average, 1990-99	WEO	
Real Shocks			
Output gap volatility	Average, 1990-99	WEO	Standard deviation of output gap (percent of potential GDP).
Terms of trade volatility	Average, 1990-99	WEO	Standard deviation of the terms of trade.
External			
Current account balance to GDP	1999-2000	WEO	
Capital account openness	1998	Lane and Milesi-Ferretti (2003)	Stocks of foreign assets and liabilities
Dollarization	2001	De Nicolo, Honohan, and Ize (2003);. Arteta (2002)	Foreign currency deposits to total deposits
Financial stability			
Currency crisis indicator	1989-99	IFS	Weighted average of % change in reserves and % change in exchange rate. Threshold is chosen to be 1 st. deviation of index plus the mean. Weights are chosen to equalize the variances. (see WEO May 1998, page 77 footnote 1)
Fiscal			
Cumulative gov bal to GDP	1990-2005	WEO	Cumulative General Govt. Balance
Financial development			
Broad money to GDP	Average, 1990-99	WEO	
Standard mkt. cap to GDP	Average, 1990-99	WDI	
Nominal stability (monthly data)			
CPI inflation, annual average	Average 1990-99	IFS	
Nominal interest rate, average	1997-2002	IFS	
Exchange rate, standard deviation, monthly	1999-2002	IFS	
CPI inflation, standard deviation, monthly	1999-2002	IFS	

Indicators	Period	Source	Notes
CPI inflation, monthly range	1997-2002	IFS	
Nominal interest rate, monthly range	1997-2002	IFS	
Exchange rate annual change, monthly range	1997-2002	IFS	
Institutional			
Freedom index	2001/2002	Freedomhouse.org	
Central bank inflation focus	1999	Fry and others (2000)	
Central bank exchange rate focus	1999	Fry and others (2000)	
Central bank discretion	1999	Fry and others (2000)	

Figure 1. Monetary Regimes, Central Bank Self-Reported Policy Discretion and Commitment, 1999
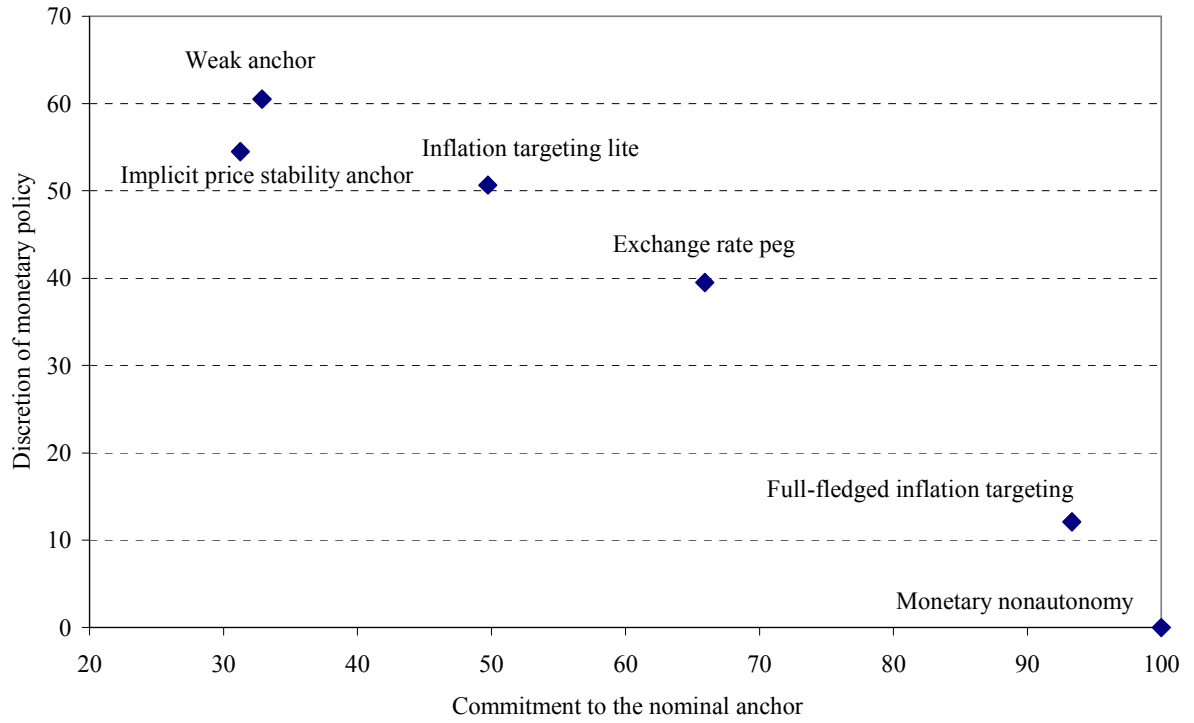
Source: Fry and others (2000).

Figure 2. Monetary Regimes, Larger and More Developed Countries, 1990–2003
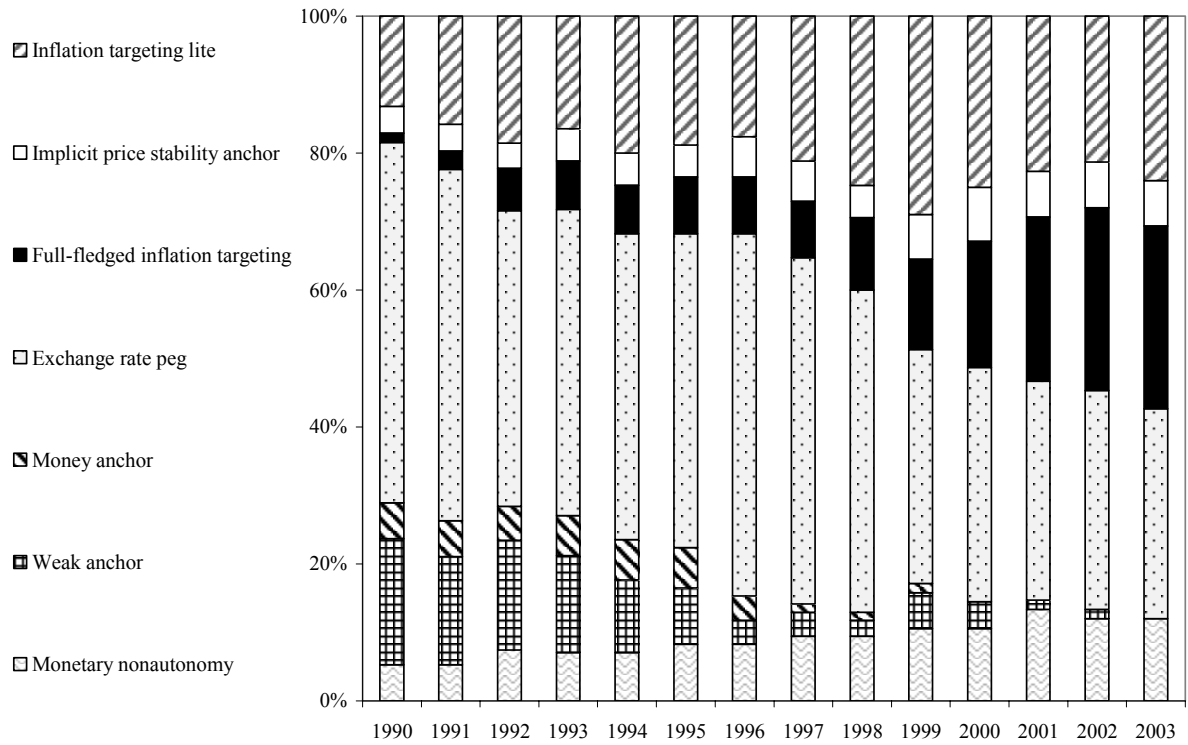
Figure 3. Monetary Regimes, Inflation and Exchange Rate Changes, 1990-2003

3a. Annual Average CPI Inflation, 1990-2003
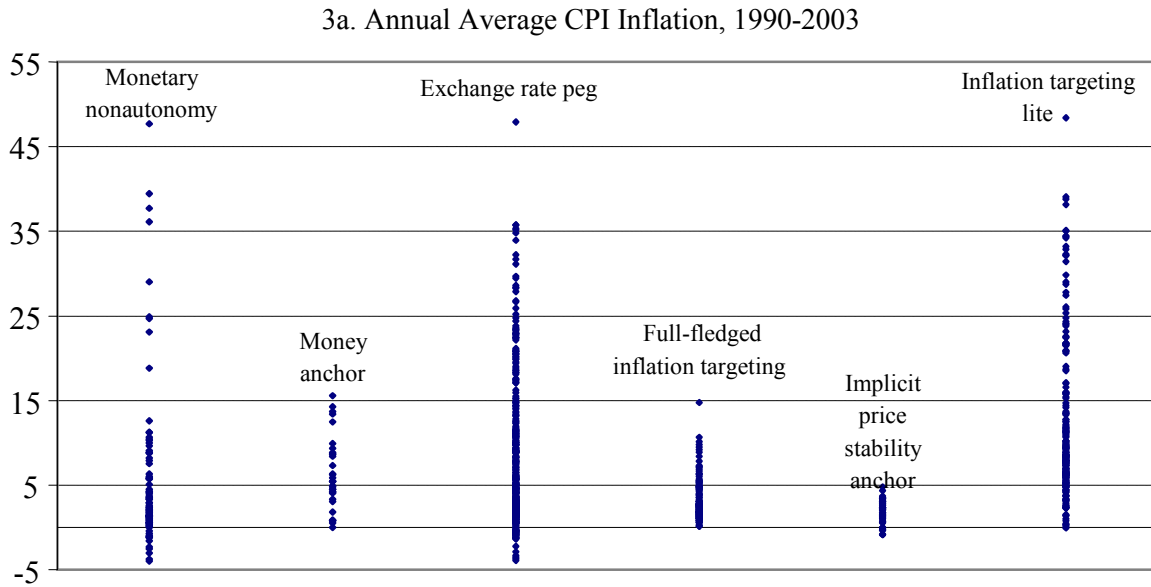
3b. Annual Average Change in the U.S. Dollar Exchange Rate, 1990-2003
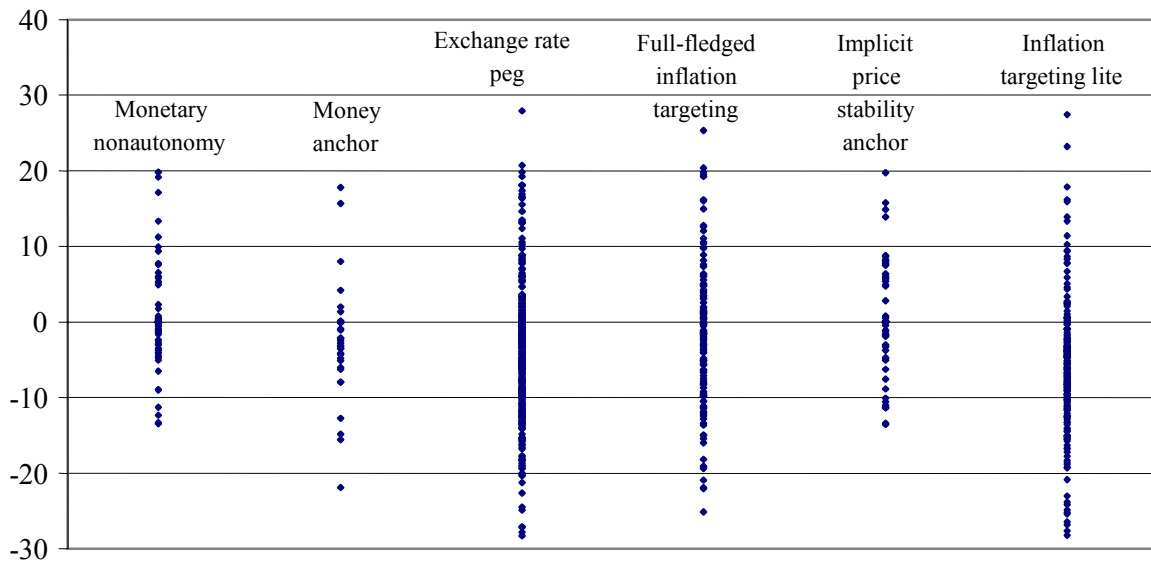
Source: IFS.

Figure 4. Monetary Regimes, Advanced Countries, 1990–2003
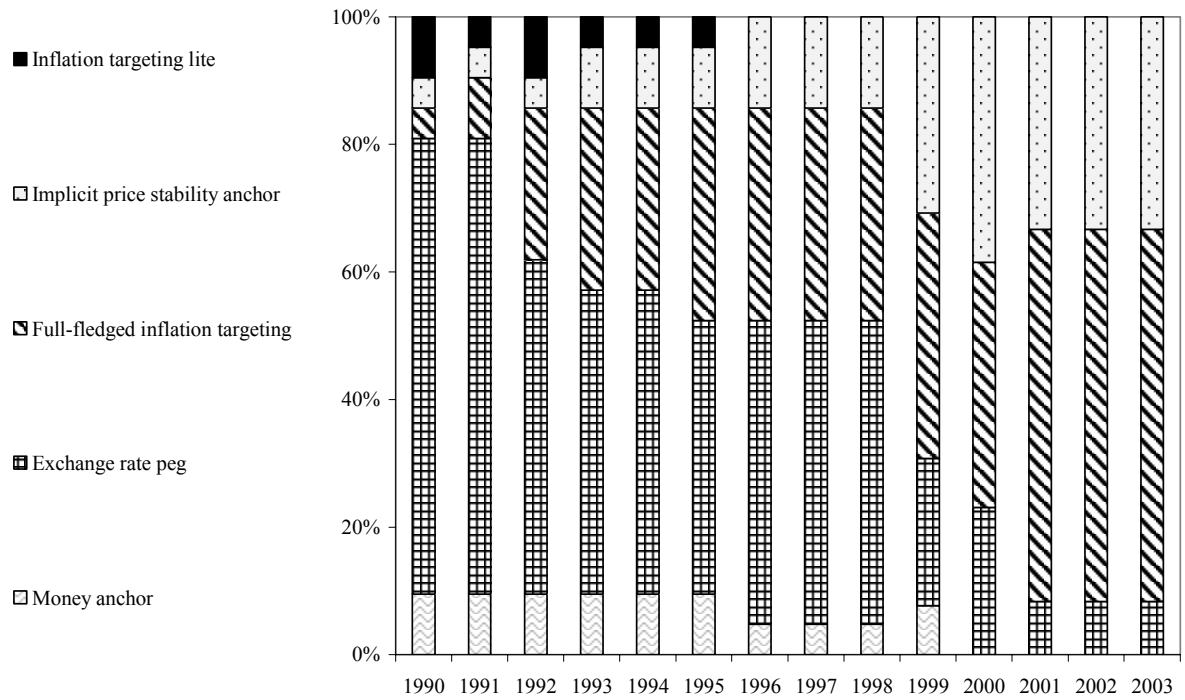
Figure 5. Monetary Regimes, Emerging Market Countries, 1990–2003
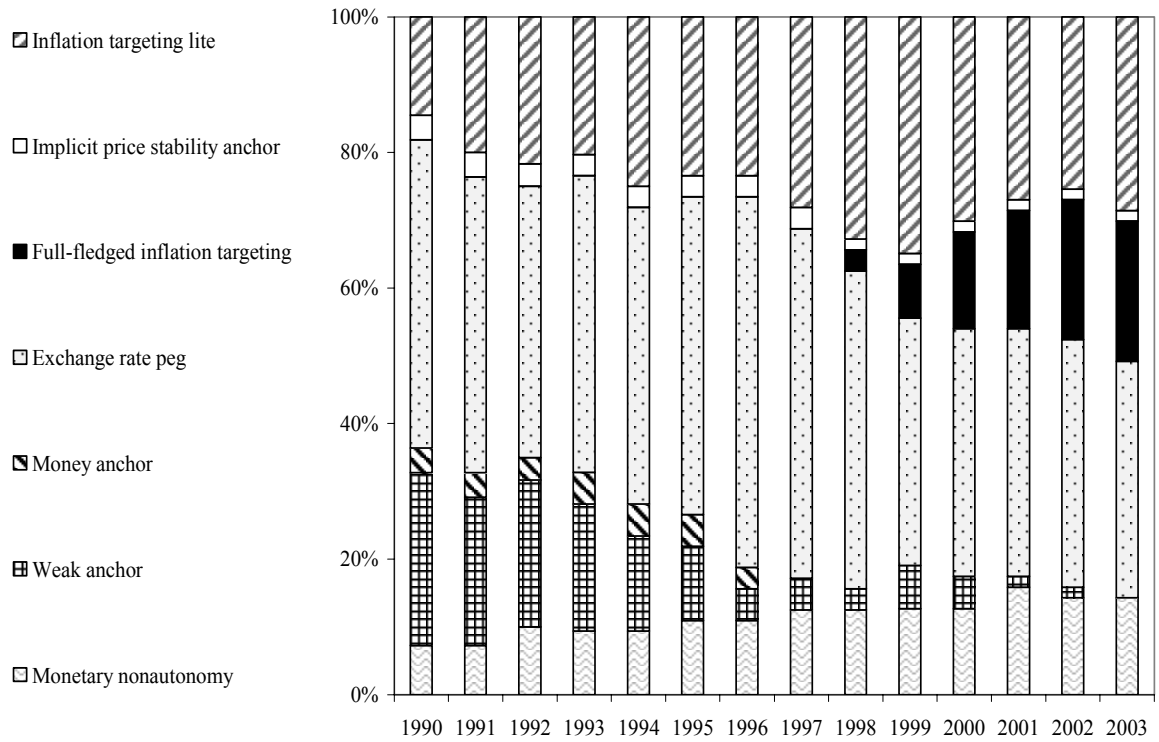
Figure 6. Discretion Index, Advanced and Emerging Markets, 1990–2003
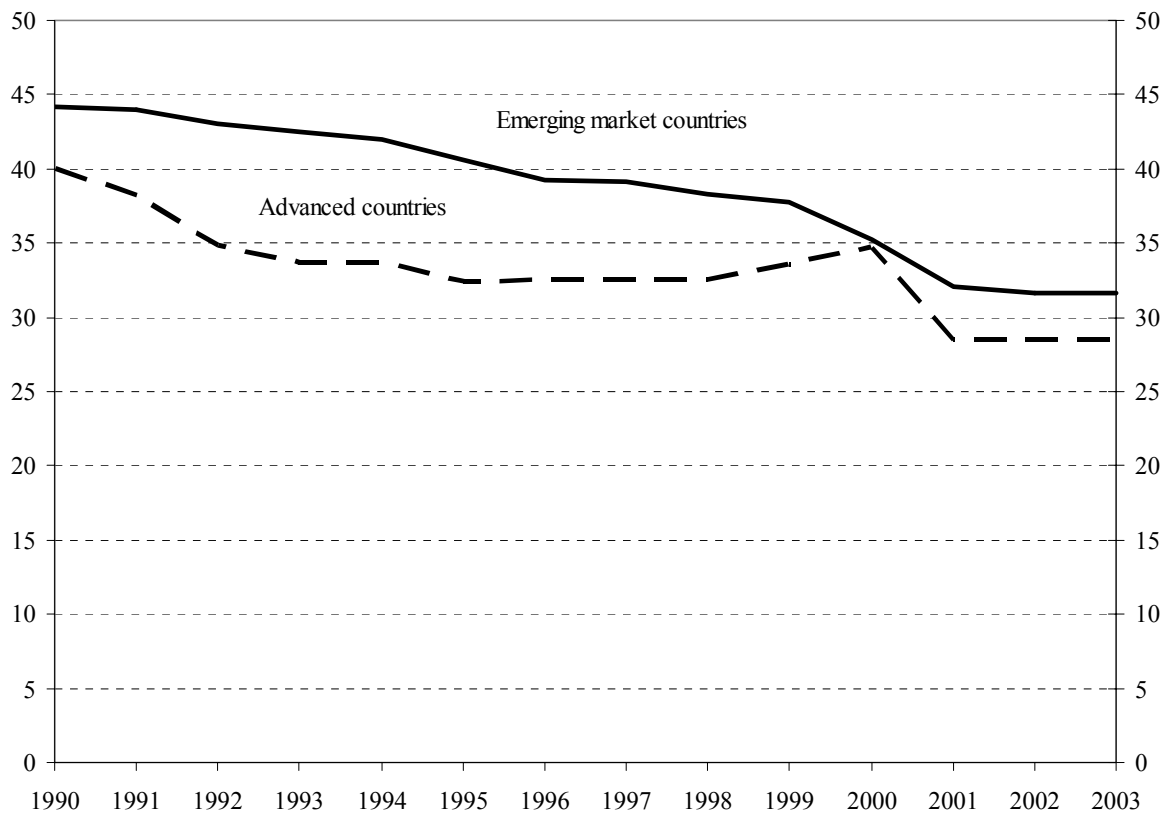
Figure 7. Monetary Regime Decision Tree

Nonautonomous
Monetary Regime

Autonomous Monetary
Regime

Inflation
Targeting Lite

Hard Nominal
Anchor

Exchange Rate
Peg

Inflation
Anchor

Full-Fledged
Inflation
Targeting

Implicit price
stability anchor
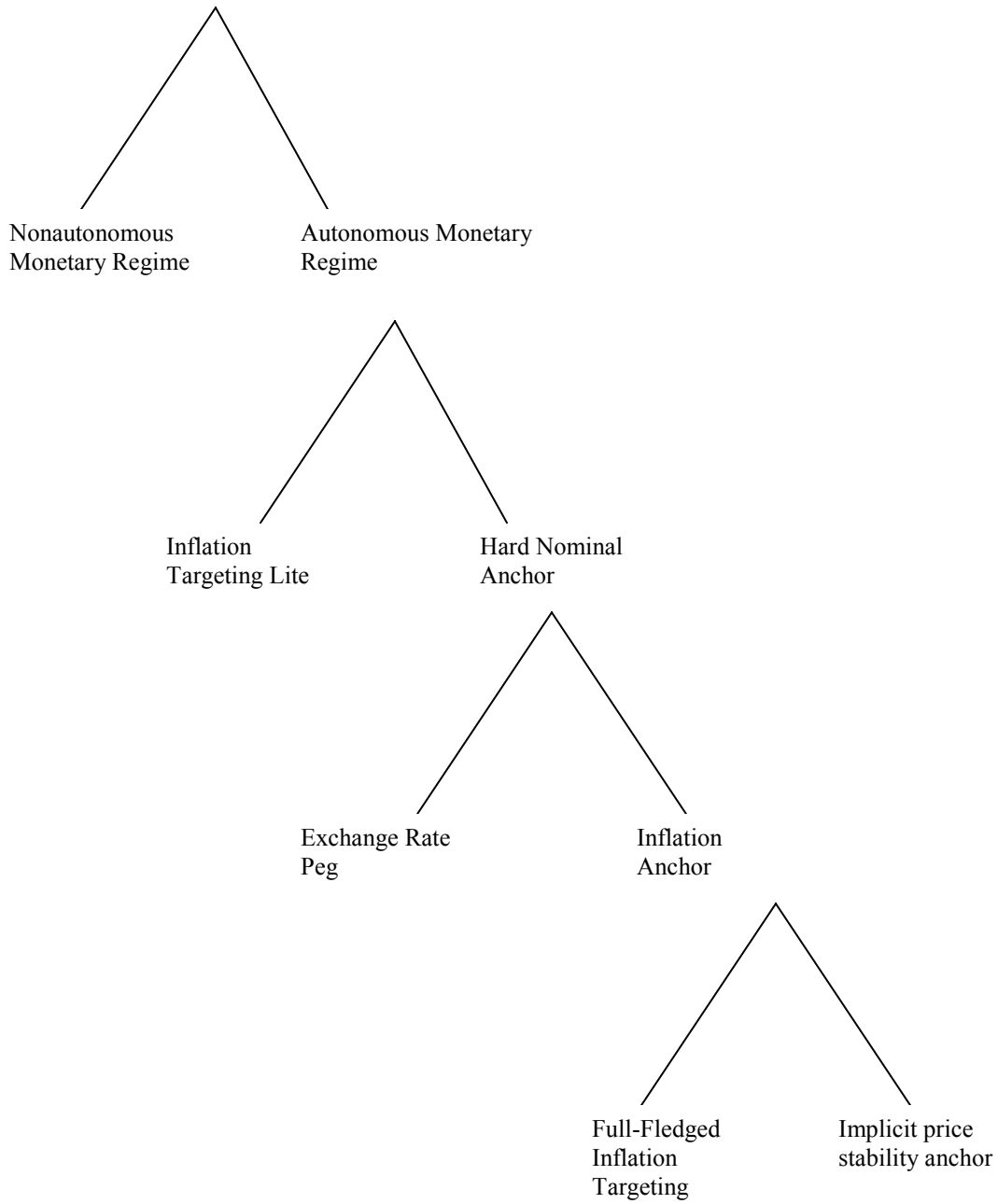
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