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Can the Release of a Monetary Overhang Trigger Hyperinflation?

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Abstract

It is widely feared that, once prices are decontrolled in the formerly centrally-planned economies, households' release of previously accumulated money will trigger a hyperinflation. This paper finds, instead, that whether a country's fiscal, monetary, and labor market policies are destabilizing typically does not depend on the money stock. However, the release of a monetary overhang can precipitate a large initial real wage shock. To the extent such a shock is not feasible politically, there is a motive for monetary reform, which must be weighed against the cost of reduced public confidence in money.

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* Discussions with Michael Gavin and Peter Wickham helped to illuminate the model, while Catherine Fleck provided editorial assistance.

Contents

Summary

It is widely feared that, once prices are decontrolled in the formerly centrally-planned economies, the release of financial assets accumulated by households will touch off a hyperinflation. This paper finds, instead, that the money stock typically has little influence over whether a country's fiscal, monetary, and labor market policies are destabilizing. High inflation is fundamentally a flow problem, not a problem of an initial money stock. Admittedly, an initial inflation can elicit more inflation, but the responses tend to be damped rather than explosive.

The money stock does bear directly, however, on the dimensions of the initial price surge and the consequent shock to real wages. The real wage compression must allow consumer markets to absorb over time not only the initial overhang, but also the subsequent rounds of monetary emissions induced by the overhang. To permit recovery of future real wages, as required by labor market pressures, present real wages must bear most of the shock. The shock tends to be greater, the larger the initial holdings of cash and bonds, or the weaker the stabilization policies pursued.

Measures to soften the initial wage shock demand careful scrutiny. Social expenditure measures should be limited to the neediest and/or phased out over time. If this is not politically feasible, a monetary overhang may indeed become "too big to work off," unless other stabilization policies are made more stringent. By spreading the adjustment burden over time, temporary wage controls (or reductions in guaranteed indexation) may be particularly helpful in easing the immediate shock. Another possible remedy is monetary reform, whose merits should be weighed against the likely further diminution of households' confidence in domestic money.

These theoretical findings appear to be borne out by the recent Eastern European experience with price liberalization. The initial price surge quickly gave way to manageable rates of inflation, albeit at the cost of substantial labor unrest. In the former Soviet republics, stabilization appears to be endangered less by the existing monetary stock than by the attempts to peg minimum wages and social benefits at unsustainably high levels.

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I. Introduction

In the transition from a centrally-planned economy to a market-regulated economy, it is widely agreed that price liberalization is essential. However, many economists fear that, without supporting measures to reduce the accumulated money stock or to make it less liquid, large-scale price decontrol would touch off a spiraling inflation. The argument runs essentially as follows. The money supply exceeds what would be demanded if existing prices were market-clearing. If prices are decontrolled, part or all of the excess money supply, or "monetary overhang," will flood the market, thereby pushing up prices. The initial inflationary surge will stimulate catch-up wage demands and higher government spending; monetization of deficits will lead to more inflation and another cycle of wage increases and deficit spending.

For instance, Dornbusch (1990), in reviewing the post World War II experience, concluded that failure to reduce or immobilize a monetary overhang during a macroeconomic stabilization tended to lead to high inflation (as in Italy and France) or to hyperinflation (as in Hungary and Greece). In countries with monetary overhangs, wrote Dornbusch and Wolf (1990), "monetary reform, early and decisive, is an essential precondition for reconstruction."

Fears that the monetary overhang would destabilize a free market are widespread in the former Soviet Union. The concerns have been seconded in the West by, among others, McKinnon (1990), Feldstein (1990), Ofer (1990), and--in their recent joint study of the Soviet economy--by the IMF, IBRD, OECD, and EBRD:

> "Even in the absence of new liquidity injections, and without other measures to reduce the monetary surplus, the price increase required to remove the overhang could be fairly substantial ... The real risk is, however, that the first round of price increases would start an inflationary spiral. This, of course, is more likely in the presence of indexation mechanisms (of both labor incomes and interest rates), which may be difficult to avoid." (IMF et al., (1991), p. 396; hereafter "Joint Study").

The Joint Study recommended that noninflationary methods of dealing with the monetary overhang be considered, including the sale of state property, the redirection of production and foreign imports to consumer goods, the partial confiscation or freezing of large deposits, and higher--possibly indexed--interest rates for bonds.

Logically, the argument described above has two component hypotheses. The first is that a substantial monetary overhang exists, causing prices to surge once they are decontrolled. The second is that the initial price surge triggers an inflationary spiral. Of the two hypotheses, the first has attracted more scholarly attention. 1/ This paper, in contrast, focuses on the second hypothesis. The aim is to link the size of the initial money stock to the evolution of prices after decontrol.

Clearly, the inflationary impact of any given money stock will depend on the nature of economic interactions in the post-shortage regime. Will households hold financial assets mainly for future purchases, or mainly for immediate transaction needs? To what extent will wages be indexed to prices? How will enterprises respond to new incentives? What will be the government's fiscal and monetary stance? It is impossible in one paper to consider all of the possible variants, but we have tried to select a representative sample. Specifically, we develop a basic model, in which households save money in order to smooth consumption streams over time. In the model, wage movements are allowed to depend both on exogenous pressures and on the gap between current and desired real wages. In addition to wages at enterprises, households receive indexed transfers directly from the government and interest payments on bonds. The government collects taxes from enterprises and pays for direct government purchases, transfers to households, and interest payments on financial assets. Deficits are partially monetized.

The main limitation of our model concerns the treatment of production. In order to focus on monetary phenomena, no financial feedback on the real sector is allowed. The base case assumes, even more restrictively, that output is constant over time. It is hoped that future research will address this shortcoming.

Generally, we find that the release of a monetary overhang does not result in permanent inflation, much less a hyperinflation. High inflation is fundamentally a flow problem, not a problem of the initial money stock. Admittedly, an initial inflation can elicit more inflation, but the responses tend to be damped rather than explosive. Our analysis does suggest, though, that even a moderate monetary overhang may cause a large initial price surge and thus a substantial real wage shock to households. The real wage compression must allow consumer markets to absorb over time not only the initial overhang, but also the subsequent rounds of monetary emissions induced by the overhang. To permit recovery of future real wages, as required by labor market pressures, present real wages must bear most of the shock. If this is not politically feasible, a monetary overhang may

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1/ Proponents include, in addition to the sources mentioned above, Birman (1980), Belkin and Ivanter (1983, p. 108), Goldman (1983, pp. 55, 98), and Bornstein (1987). Critics include Alexeev (1988, 1991), Alexeev, Gaddy, and Leitzel (1990) and Cochrane and Ickes (1991). In most of the discussion, monetary overhang is identified with forced savings, although the former could in principle exist without the latter--say, if price decontrol would reduce transaction demands for money. Also, if relative wages are artificially high and nominal wages are sticky, prices might surge after decontrol even if money holdings are minimal.

indeed become "too big to work off," unless other stabilization policies are made more stringent.

The paper is organized as follows. The next section presents a model in which savings motives drive the post-liberalization financial sector. It analyzes the causes of, and remedies for, destabilization. Section III introduces various modifications to the basic model. Section IV analyzes a special case in which bond holdings are constrained to be zero and money is held only for current purchases. Section V reports on some simulations on the basic model, while Section VI summarizes the policy implications.

II. A Savings-Driven Model

In all of the models examined in this paper, there are essentially two active economic agents: a representative household, and a government that owns the enterprises and the banks. A single type of good, which is perishable, is produced. At time t=0, prices are decontrolled. In this section, a model is developed in which there are two financial assets--money and bonds--and in which savings motives play a driving role.

1. Description

The representative household has the iso-elastic utility function

$$U = \int_0^\infty \frac{x_t^\gamma}{\gamma} e^{-rt} dt, \tag{1}$$

where x_t is goods consumption at time t, γ is a constant less than 1, 1/ and r is the discount rate. The good costs P_t at time t. A fixed amount of labor is employed and earns a wage W_t. The household also receives direct monetary transfers from the state--say, pensions or child support allowances, or salaries from administrative organizations. Average transfers are a fraction b, assumed constant, of average wages. The household's third source of income is interest at rate i on holdings B_t of government bonds. We assume that bonds are redeemable at any time for face value. 2/

Bonds are the only interest-bearing asset, but households also own money, M_t. In a continuous-time version of a cash-in-advance constraint, money holdings are assumed to be at least a fraction c of purchases. The constraint will always be binding, so

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1/ The elasticity of substitution is $1/(1-\gamma)$. Technically the expression is not defined when $\gamma = 0$, but it converges smoothly to logarithmic utility as γ approaches 0.

2/ This assumption is not necessary in cases where nominal government debt is increasing over time.

$$M_t = cP_t x_t \quad , \tag{2}$$

and the velocity equals 1/c. Changes in bond holdings over time are given by the equation

$$\dot{B}_t = (1+b)W_t - P_t x_t - \dot{M}_t + iB_t \quad , \tag{3}$$

where the raised dot indicates a derivative with respect to time.

By subtracting iB_t from both sides of equation (3), multiplying by e^{-it} and integrating by parts, bond holdings at time T can be calculated as

$$B_T e^{-iT} = \int_0^T [(1+b)W_t - (1+ic)P_t x_t] e^{-it} dt - cP_T x_T e^{-iT} + A \quad , \tag{4}$$

where $A \equiv B_0 + M_0$ denotes the household's initial financial assets. The transversality condition on bond holdings requires that $B_T e^{-iT}$ approach zero as T approaches infinity; otherwise, households could measurably improve their welfare by consuming more. As will be demonstrated later, $P_T x_T e^{-iT}$ also approaches zero for large T. Under these conditions, the household budget constraint can be rewritten as

$$\int_0^\infty (1+ic)P_t x_t e^{-it} dt = \int_0^\infty (1+b)W_t e^{-it} dt + A \quad . \tag{5}$$

Hence, the cash-in-advance constraint acts like a tax at rate i on currency holdings--since this is the opportunity cost of not holding bonds--or, equivalently, a tax at rate ic on purchases.

Maximization of utility (1) subject to a budget constraint (4) or (5) yields the first-order condition

$$x_t^{\gamma-1} e^{-rt} = \lambda (1+ic) P_t e^{-it} \quad , \tag{6}$$

where λ is the shadow price of wealth.

Government revenues consist of enterprise profits $P_t y_t - W_t$, where enterprise output y_t is assumed to be exogenous. A fraction *a* of output is purchased by the government for its own consumption. The other components of government spending are transfers to households bW_t and interest payments iB_t on bonds. The deficit D is financed completely by a mixture of seignorage and bond sales to households, so that

$$D_t = \dot{M}_t + \dot{B}_t = (a-1)P_t y_t + (1+b)W_t + iB_t \quad . \tag{7}$$

To close the system, something needs to be said about the wage-setting process. Because labor demand is assumed to be inelastic, it is difficult to tie real wages directly to labor productivity without fixing them for all time. It seems more reasonable to allow for large short-run fluctuations, with long-run reversion to some norm. Specifically, we shall assume that the initial wage, W_0, is given, and that the nominal wage inflation after time 0 has a "drift" component and a "catch-up" component. The drift component is a constant μ. The catch-up component depends on the gap between the actual real wage W_t/P_t and a target real wage ω. Algebraically,

$$\frac{\dot{W}_t}{W_t} = K(\omega - \frac{W_t}{P_t}) + \mu \quad , \tag{8}$$

where K indicates the adjustment speed.

For computational reasons, it is convenient to assume that the adjustment speed K is not constant, but instead varies inversely with the real wage. This makes it even more difficult to sustain abnormally low real wages, and thus would appear to make it more likely that the release of a monetary overhang would catalyze high inflation. With $K=kP_t/W_t$ for some constant k, equation (8) can be simplified to:

$$\dot{W} = k\omega P + (\mu - k)W \quad . \tag{9}$$

Alternatively, equation (9) could be generated directly by assuming that the catch-up component is linear in the ratio of the target to the actual real wage.

2. Solution

Let us review the mathematical structure of the system just described. We have a global budget constraint (4) plus, for each moment in time, a first-order condition (6) for utility maximization, a cash-in-advance constraint (2) on the money supply, a financing equation (7) linking bond issuance to the deficit, a wage adjustment equation (9), and the goods market equilibrium condition $x_t = y_t$. There are an equal number of variables to be determined: λ and, for each moment in time, P_t, M_t, B_t, W_t, and x_t.

Fortunately, the system is easily solved recursively. The market equilibrium condition, given our assumption on y_t, implies that consumption x_t is always 1. Hence, P_t rises exponentially at rate i-r if there is an interior solution, independently of the initial monetary overhang:

$$P_t = P_0 e^{(i-r)t} \quad . \tag{10}$$

Intuitively, inflation at rate i-r is necessary, given interest rate i and household time preference r, for households to be indifferent at the margin between consuming and saving. Hyperinflation occurs immediately ($P_0 = \infty$) or not at all. Note also that in an interior solution, $P_t x_t e^{-it}$ eventually approaches 0, as claimed.

Given prices and production, cash balances are easily calculated from equation (2):

$$M_t = M_0 e^{(i-r)t} = c(1-a)P_0 e^{(i-r)t} \quad . \tag{11}$$

To solve for wages, we first substitute (10) into (9):

$$\dot{W}_t = k\omega P_0 e^{(i-r)t} + (\mu - k)W_t \quad . \tag{12}$$

A general solution to this type of equation is provided in the following lemma.

Lemma: Let $G_1, \ldots, G_n$, $H_1, \ldots, H_n$, J, and C denote constants. Then the equation $\dot{Z}_t = \sum_{i=1}^{n} G_i e^{H_i t} + JZ_t$ has the solution:

$$Z_t = \sum_{i=1}^{n} \frac{G_i}{H_i - J} e^{H_i t} + Ce^{Jt} \quad , \tag{13}$$

provided J does not equal H_i for any i. If J equals H_i, the term in G_i should read $G_i te^{Jt}$.

Proof: Subtract JZ_t from both sides of the equation, multiply both sides by e^{-Jt}, integrate, and then multiply by e^{Jt}. Alternatively, check that the particular solution C = 0 works, and note that Ce^{Jt} is the general solution.

Applying the lemma to equation (12), and evaluating at time 0, establishes that

$$W_t = \frac{k\omega P_0}{i - r - \mu + k} e^{(i-r)t} + \left(W_0 - \frac{k\omega P_0}{i - r - \mu + k} \right) e^{(\mu - k)t} \quad , \tag{14}$$

unless i-r equals μ-k, in which case $W_t = (W_0 + k\omega P_0 t)e^{(i-r)t}$. For the results to make economic sense, μ-k must be less than i-r. Otherwise, the real wage W_t/P_t will rise without bound over time.

To solve for bonds, substitute equations (10), (11), and (14) into (7), to obtain

$$\dot{B}_t = \left(\frac{(1+b)k\omega}{i-r-\mu+k} - (1-a)(1+ci-cr) \right) P_0 e^{(i-r)t} + \left(W_0 - \frac{k\omega P_0}{i-r-\mu+k} \right) (1+b) e^{(\mu-k)t} + iB_t \tag{15}$$

Applying the lemma again yields a solution

$$B_t = \left((1-a)(1+ic-rc) - \frac{(1+b)k\omega}{i-r-\mu+k} \right) \frac{P_0}{r} e^{(i-r)t} + \left(\frac{k\omega P_0}{i-r-\mu+k} - W_0 \right) \frac{1+b}{i-\mu+k} e^{(\mu-k)t} + Ce^{it} \tag{16}$$

for some constant C. In order not to violate the transversality requirement on household bond holdings, C must equal zero. Evaluation of (16) at time 0 indicates that

$$B_0 = A - M_0 = A - c(1-a)P_0$$
$$= \left((1-a)(1+ic-rc) - \frac{(1+b)k\omega}{i-r-\mu+k}\right)\frac{P_0}{r} + \left(\frac{k\omega P_0}{i-r-\mu+k} - W_0\right)\frac{1+b}{i-\mu+k} \qquad (17)$$

from which it follows that

$$P_0 = \frac{(i-\mu+k)rA + (1+b)rW_0}{(i-\mu+k)(1-a)(1+ic) - (1+b)k\omega} \quad . \qquad (18)$$

On the right-hand side of equation (18), both terms in the numerator are positive. The denominator will be positive if and only if

$$\frac{1+b}{(1-a)(1+ic)}\omega < \frac{i-\mu+k}{k} \quad . \qquad (19)$$

Hence, if inequality (19) is satisfied, no hyperinflation will occur, and the system variables will be completely determined by (10), (11), (14), (16), and (18). If (19) is not satisfied, hyperinflation sets in the moment prices are decontrolled. Note that whether price decontrol leads to hyperinflation has nothing to do with the initial stock of money or bonds, but depends on flow parameters only.

Using (19), it is possible to rigorously define the monetary overhang as the difference between A and that level of assets A^* for which the initial price surge would be zero. From (18), A^* can be calculated as

$$\frac{[(i-\mu+k)(1-a)(1+ic) - (1+b)k\omega]P_- - (1+b)rW_0}{(i-\mu+k)r} \quad , \qquad (20)$$

where P_- is the price prevailing before liberalization.

3. Discussion

An initial price jump 1/ helps to temporarily work off "excess" money in three ways. First, it reduces the real value of financial assets. Second, it increases the amount of money needed for transaction purposes. Third, it temporarily reduces real wages, so that households draw on savings to smooth consumption. At first glance, then, any financial stock can be accommodated through a sufficiently high price level.

However, as explained above, the initial price surge must be followed by a stable inflation at rate i–r, so that the real interest rate will equal the household discount rate. Otherwise, households will not save and

1/ The discussion assumes that the composite goods price before decontrol are less than or equal to the long-run equilibrium price. This seems to be the typical case in practice. Formally, the concepts of "price jumps" and "wage compression" are intended to be forward-oriented; that is, the initial price or wage is compared with their long-run equilibrium values.

consume simultaneously. Meanwhile, the recovery and exogenous drift of wages and wage-based transfers serve to increase household demand. Depending on the transaction demand for money, the underlying fiscal balance, and the intensity of wage catch-up and drift components, price increases may compel more financial assets to be issued at the margin than can be absorbed. If so, a post-decontrol price balance is impossible, regardless of the initial financial wealth of households.

Intuitively, one would expect reduced wage pressure, in terms of a lower target wage ω, a smaller drift μ, or a slower adjustment speed k, to be favorable to stabilization. Stabilization would also appear to be favored by reductions in direct government consumption a or transfers b, a higher transaction demand c for money, or a higher nominal interest rate i. These impressions--which also reflect the conventional policy prescriptions for stabilization--are confirmed by analysis of (19). Not surprisingly, comparative statics analysis of equation (18) shows that the factors favoring a <u>finite</u> P_0 also tend to favor a <u>lower</u> P_0. 1/

If hyperinflation does not occur, the initial price surge will be linear in initial financial assets A, and can be dramatic. Thereafter, the real wages W_t/P_t and the real debt B_t/P_t will each converge at exponential rate μ-i+r-k to steady-state values. The steady-state real wage $(W/P)^*$ is $k\omega/(i-r-\mu+k)$, while steady-state real bond holdings $(B/P)^*$ are $[(1-a)(1+ic-rc)-(1+b)(W/P)^*]/r$. It may seem odd that real financial wealth does not converge to zero, but no optimality conditions are violated. The household continues to earn a real interest rate r on bond holdings at time t, while their <u>present value</u> does indeed approach zero as t gets large. If real wages converge from below, bond holdings will converge from above, and vice-versa. Hence, a financial overhang will tend to be dissipated at the same rate as real wages recover.

The government deficit, exclusive of interest payments on debt, is known in the fiscal literature as the primary deficit. In the model, the primary deficit is given by the first two terms on the right-hand side of equation (15), so the real primary deficit must equal

$$\frac{(1+b)k\omega}{i-r-\mu+k} - (1-a)(1+ci-cr) + \left(W_0 - \frac{k\omega P_0}{i-r-\mu+k}\right)(1+b)e^{-(i-r-\mu+k)t} = -r\left(\frac{B}{P}\right)^* - (1+b)\left(\frac{W}{P}\right)^* + (1+b)\frac{W_t}{P_t} \qquad (21)$$

In other words, in a stable regime with a positive monetary overhang, the real primary deficit converges from below to a negative constant, $-r(B/P)^*$;

1/ The one exception is $\partial P_0/\partial k$, which takes the sign of $(i-\mu)\omega A + [(1+b)\omega-(1-a)(1+ic)]W_0$. The main source of uncertainty is the possibility that the initial monetary overhang is negative, in which case real wages initially overshoot their long-run value. In the more policy-relevant case of a positive overhang, it can be shown that $\mu \le i-r$ is a sufficient condition for P_0 to rise with k.

i.e., the government must run a primary surplus. Of course, a primary surplus can coexist with an overall deficit, if the nominal interest rate i (and long-run inflation) is sufficiently large.

While the model assumes that wage adjustment parameters are exogenous, an economic perspective suggests that the drift coefficient will itself vary with expectations of inflation, and that in the long run the two might meet. If μ equals i-r, the actual real wage will converge to the target ω. Similarly, the target real wage might be thought to adjust over time to the actual productive capacity of the economy, taking into account the fiscal and monetary demands. Note that the goods supplied to households cost $(1-a)P_t$ directly, plus a transaction cost equal to ic times the direct cost, while nominal household demand is $(1+b)W_t$. Hence, a "reasonable" target wage ω^* might be (1-a)(1+ic)/(1+b). If μ equals i-r and ω equals w^*, the left-hand side of (19) equals 1, while the right-hand side equals 1+r/k. Under these conditions, then, hyperinflation will not occur. Moreover, real bond holdings will converge to -c(1-a), which exactly counters real money holdings: total real financial assets will converge to zero. Finally, formula (18) for the initial price will reduce to

$$P_0 = \frac{(r+k)A + (1+b)W_0}{(1-a)(1+ic)} = \frac{(r+k)A}{(1-a)(1+ic)} + \frac{W_0}{\omega^*} \quad . \tag{22}$$

If initial financial wealth A is zero, the actual real wage jumps immediately to the steady-state value. Otherwise, the magnitude of the initial price jump will be extremely sensitive to the expected wage catch-up parameter k, and accurate prediction will, in practice, be difficult.

The model also permits observations on the distributional impact of price liberalization. Although the previous derivations assumed a single representative household, they continue to apply when individual households deviate from the average in their initial financial assets or differ in the timing of their labor supply. Since the price is rising exponentially at rate i-r, equation (6) shows that a given household will consume the same real amount every period; substitution into the budget constraint (5) shows that this amount equals $rZ/[(1+ic)P_0]$, where Z equals the present value at time 0 of wealth. In economic terms, the real value in goods of wealth at time 0 equals the nominal value deflated by the effective price $(1+ic)P_0$; the real interest yield r on these goods is consumed each period. Hence, the real consumption return on initial financial assets A equals

$$\frac{rA}{(1+ic)P_0} = \frac{(1+ic)(1-a)(i-\mu+k)A - (1+b)k\omega A}{(1+ic)(i-\mu+k)A + (1+ic)(1+b)W_0} \quad , \tag{23}$$

while the gross real consumption return to labor equals the remainder

$$1 - a - \frac{rA}{(1+ic)P_0} = \frac{(1+b)k\omega A + (1+ic)(1-a)(1+b)W_0}{(1+ic)(i-\mu+k)A + (1+ic)(1+b)W_0} \quad . \tag{24}$$

Invoking the stabilization requirement (19), it is readily shown that a higher A increases the real consumption to wealth holders at the expense of wage earners. However, the marginal transfer is less, the more narrowly (19) is satisfied. Hence, stabilization helps holders of financial wealth at the expense of workers. In fact, differentiation of (23) and (24) with respect to other parameters shows that every parameter shift favorable to stabilization raises the returns to financial wealth and—except for reductions in government consumption a—reduces the returns to workers. Of course, these calculations ignore the potential connection between monetary stabilization and long-term economic growth. Nevertheless, to the extent that this connection is denied or not appreciated, the findings help account for the widespread unpopularity of stabilization programs. Conversely, stabilization programs tend to be received more favorably when the country in question has recently experienced a growth-disrupting hyperinflation. In any event, a stringent monetary stabilization does yield one additional benefit to workers: it reduces the short-term compression of the real wage that is attendant to price decontrol.

III. Modifications

It may be wondered how robust the preceding results are to the particular assumptions of the model. This section makes various adjustments to the model, while preserving its basic structure.

1. Exogenous growth

The first modification involves exogenous economic growth at rate g. From equation (6), it follows that

$$P_t = P_0 e^{(i-r+\gamma g-g)t} \quad , \tag{25}$$

so that price grows exponentially at rate $i-r+(\gamma-1)g$. Since γ is less than 1, inflation will be less than $i-r$ when the economy is expanding, and greater than $i-r$ when the economy is contracting. Cash balances are given by

$$M_t = c(1-a)P_0 e^{(i-r+\gamma g)t} \quad . \tag{26}$$

It seems reasonable to assume that the target wage also grows at the rate g. If so, the differential equation for wages becomes

$$\dot{W}_t = k\omega_0 P_0 e^{(i-r+\gamma g)t} + (\mu-k)W \quad , \tag{27}$$

where ω_0 refers to the target wage at time 0. Applying the lemma and evaluating at time 0 yields the solution

$$W_t = \frac{k\omega_0 P_0}{i-r+\gamma g-\mu+k} e^{(i-r+\gamma g)t} + \left(W_0 - \frac{k\omega_0 P_0}{i-r+\gamma g-\mu+k}\right) e^{(\mu-k)t} \quad . \tag{28}$$

unless $i-r+\gamma g$ equals $\mu-k$, in which case $W_t = (W_0+k\omega_0 P_0 t)e^{(i-r+\gamma g)t}$. For the real wage not to diverge without bound from the target, $\mu-k$ must be less than $i-r+\gamma g$.

Substitution of (25), (26), and (28) into (7) establishes that

$$\begin{aligned}\dot{B}_t = &\left(\frac{(1+b)k\omega_0}{i-r+\gamma g-\mu+k} - (1-a)(1+ci-cr+c\gamma g)\right)P_0 e^{(i-r+\gamma g)t} \\ &+ \left(W_0 - \frac{k\omega_0 P_0}{i-r+\gamma g-\mu+k}\right)(1+b)e^{(\mu-k)t} + iB_t\end{aligned} \quad . \tag{29}$$

Equation (29) is identical with equation (15), provided the discount rate r in (15) is replaced by $r-\gamma g$ and ω is replaced by ω_0. Subject to these changes, equations (16) and (18) for bond holdings and initial price level continue to apply, as does the necessary and sufficient condition (19) for stabilization. If stabilization occurs, the initial price will be lower by a factor of $\gamma g/r$ than it would be if real growth were zero. Hence, the initial price will rise with the real economic growth rate if and only if the intemporal elasticity of substitution in consumption is less than 1 ($\gamma < 0$). For logarithmic utility, real growth will affect only the inflation rate (reducing it point for point); bond holdings, cash balances, wages, and the initial price will be unaffected.

The model can be solved in similar fashion for variable real growth, provided the growth profile is exogenous.

2. Revenue adjustments

In the basic model, it was assumed that the government taxes away all enterprise profits but not wages. Suppose more generally that the government collects a fraction θ_p of profits and θ_w of wages. Untaxed profits are assumed, without loss of generality, to be distributed to workers. 1/ Such distributions may reflect formal worker ownership provisions or informal union pressures.

Mathematically, only two changes are required in the system-determining equations. First, in the household budget constraint (5), the present value of wealth becomes

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1/ A share of enterprise profits could be used to finance internal investment. However, since the model does not distinguish between productive and unproductive spending, and since credit markets are assumed to be frictionless, little harm is done by aggregating the enterprise and government accounts.

$$\int_0^\infty [(1-\theta_w+b)W_t + (1-\theta_p)(P_t-W_t)]e^{-it}dt + A = \int_0^\infty [(\theta_p-\theta_w+b)W_t + (1-\theta_p)P_t]\,dt + A \quad . \tag{30}$$

Second, the deficit equation (7) becomes

$$D_t = \dot{M}_t + \dot{B}_t = (a-\theta_p)P_t y_t + (\theta_p y_t - \theta_w + b)W_t + iB_t \quad . \tag{31}$$

The rest of the calculations proceed as before. Hence, if 1–a is replaced by θ_p–a, and if 1+b is replaced by $\theta_p-\theta_w$+b, all of the formulas for wages, bonds, money, and prices continue to apply. In particular, hyperinflation occurs if and only if

$$\frac{\theta_p - \theta_w + b}{(\theta_p - 1)(1 + ic)} \geq \frac{i - \mu + k}{k} \quad . \tag{32}$$

Once again, the size of the monetary overhang has no bearing on whether a hyperinflation occurs. The flow parameters affecting stabilization continue to exert the same qualitative influence as before. Not surprisingly, higher profit or wage taxes favor stabilization, and also serve to restrain the initial price surge if stabilization occurs. Other taxes can be incorporated in similar fashion.

One can also make allowances for the so-called Oliviera–Tanzi effect (see Oliviera (1967) and Tanzi (1977)), namely, the notion that high inflation may, through lags in tax collection, worsen the budget deficit. A simple way to do this is to let the budget deficit depend not just on prices and wages, but also on the rate of change of prices, e.g.:

$$D_t = \dot{M}_t + \dot{B}_t = (a-1)P_t + (1+b)W_t + \sigma\dot{P}_t \tag{33}$$

for some positive constant σ. Since price rises exponentially at rate i–r, the effect is simply to add σ(i–r) to a. Similarly, the deficit could depend linearly on the rate of change of wages without qualitatively altering the model.

One might argue that price decontrol is so disruptive as to effectively void tax collections for a period of time τ. To analyze this scenario, we begin by observing that the price, money, and wage equations (10), (11), and (14) continue to hold. After tax collections are restored, the debt equation (16) will also hold, with a zero coefficient on e^{it}. Hence, government debt at time τ satisfies

$$\begin{aligned} B_\tau &= \left((1-a)(1+ic-rc) - \frac{(1+b)k\omega}{i-r-\mu+k}\right)\frac{P_0}{r}e^{(i-r)\tau} + \left(\frac{k\omega P_0}{i-r-\mu+k} - W_0\right)\frac{1+b}{i-\mu+k}e^{(\mu-k)\tau} \\ &\equiv g_1 P_0 - \frac{(1+b)e^{(\mu-k)\tau}}{i-\mu+k}W_0 \end{aligned} \tag{34}$$

where the coefficient g_1 depends only on the flow parameters and τ, not on the initial financial assets. Until tax collections are restored, the differential equation (15) describing debt will apply, provided 1–a and 1+b are replaced by -a and b respectively. Application of the lemma yields a general solution for t in $(0,\tau)$ of

$$B_t = \left(-a(1+ic-rc) - \frac{bk\omega}{i-r-\mu+k}\right)\frac{P_0}{r}e^{(i-r)t} + \left(\frac{k\omega P_0}{i-r-\mu+k} - W_0\right)\frac{b}{i-\mu+k}e^{(\mu-k)t} + Ce^{it} \quad (35)$$
$$= (g_2 e^{(i-r)t} + g_3 e^{(\mu-k)t})P_0 - \frac{be^{(\mu-k)t}}{i-\mu+k}W_0 + Ce^{it}$$

where the coefficients g_2 and g_3 depend only on the flow parameters. For continuity, equation (35) must also hold at $t = \tau$ and $t = 0$, so that

$$B_\tau = (g_2 e^{(i-r)\tau} + g_3 e^{(\mu-k)\tau})P_0 - \frac{be^{(\mu-k)\tau}}{i-\mu+k}W_0 + Ce^{i\tau} \quad (36)$$

and

$$B_0 = A - M_0 = A - c(1-a)P_0 = (g_2 + g_3)P_0 - \frac{b}{i-\mu+k}W_0 + C \quad . \quad (37)$$

The constant C is determined by equating (36) and (34). Substitution into (37) establishes that

$$P_0 = \frac{A + \dfrac{b + e^{-(i-\mu+k)\tau}}{i-\mu+k}W_0}{c(1-a) + g_1 e^{-i\tau} + g_2 - g_2 e^{-r\tau} + g_3 - g_3 e^{-(i-\mu+k)\tau}} \quad . \quad (38)$$

The numerator in (38) is positive. Hence, hyperinflation occurs if and only if the denominator in (38) is negative, which in turn depends only on flow parameters and τ, not on the initial monetary overhang.

3. Social expenditure adjustments

With imperfect household credit markets and uneven distribution of income, the temporary compression of the real wage as a consequence of price liberalization will cause substantial hardship for some. Accordingly, the government may wish to cushion the shock by increasing the average level b of transfers. Suppose, for example, that transfers are increased to a level of b^+ for a period of time τ, after which they revert to b. The analysis is then very similar to the preceding analysis of interruptions in tax collection. The equations indicating price, money, and wage trends continue to apply, while the deficit equation is turned into two differential equations in B_t that "meet" at $t = \tau$. Stability again will depend only on the flow parameters and τ, not on the initial monetary overhang. Because W_0/P_0 falls, some of the short-term benefits to households of a higher b^+ are eroded. However, provided stabilization occurs, the real disposable income $(1+b^+)W_0/P_0$ will rise with b^+.

Unfortunately, this seemingly attractive remedy may be difficult to implement in practice. Once enacted, social benefits tend to be difficult to revoke. If increases in b are permanent, there is a limit to how much short-term wage shock they can cushion. Suppose, for example, that the real disposable income should never fall below a floor ϕ, so that

$$\phi \leq (1+b)\frac{W_0}{P_0} = \frac{(i-\mu+k)(1-a)(1+ic)W_0(1+b) - k\omega W_0(1+b)^2}{(i-\mu+k)rA + (1+b)rW_0}, \tag{39}$$

(The last equality in (39) follows from the substitution of (18).) Equation (39) is quadratic in 1+b, and will not have a solution for a sufficiently high value of A. Under these conditions, then, a monetary overhang can lead to hyperinflation.

Even if formally rescinded, the transfers may have to be replaced by additional wage payments. Suppose, for example, that it is the real disposable income Y = (1+b)W, rather than W proper, that responds to "drift" and "catch-up" pressures. In that case, the basic model would essentially be reproduced, except perhaps for some flexibility in the initial effective wage. This topic is discussed next.

4. Wage adjustments

A sufficiently large price surge could conceivably provoke changes in the wage-setting process. If the drift μ is permanently raised, and not offset by changes in i, hyperinflation could ensue. One should be careful, however, not to confuse a low μ with a slow response to a real wage shock. As we have defined it, wages might catch up quickly with prices even if the long-term drift were zero. It seems more likely that a large price surge would serve to raise the adjustment speed k, through the adoption of shorter labor contracts and/or broader indexation. If the targeted real wage is $\omega^* = (1-a)(1+ic)/(1+b)$, a higher k could risk hyperinflation.

Hyperinflation could also occur if there is a sufficiently high floor to the real wage. There are at least two different variants of such a floor. In the first variant, the initial wage is pegged to a certain fraction of the freely floating price, with no further controls. A sufficiently high price jump can effectively erase the value of any financial stock, so, the size of the monetary overhang is irrelevant to stabilization. Nevertheless, the initial real wage cannot exceed the following threshold, calculated by substituting A = 0 in equation (18) and solving for W_0/P_0:

$$\frac{(i-\mu+k)(1-a)(1+ic) - (1+b)k\omega}{(1+b)r}. \tag{40}$$

In the second variant, the initial wage is fixed at W_0, and fully indexed wage controls are instituted (i.e., the real wage is frozen) for a period τ. When the recovery of real wages is retarded, working off the monetary overhang requires a smaller initial real wage shock. However, if the real wage is frozen at too high a level, real financial assets will never decline to a level permitting the safe lifting of controls.

Below we calculate the maximum real wage consistent with eventual stabilization. At time τ, when controls are lifted,

$$P_\tau = \frac{(i-\mu+k)\, r(M_\tau+B_\tau) + (1+b)\, rW_\tau}{(i-\mu+k)(1-a)(1+ic) - (1+b)k\omega} \quad . \tag{41}$$

Equation (41) is simply an adaptation of equation (18). Since M_τ equals $c(1-a)P_\tau$, real debt at time τ can be calculated as

$$\frac{B_\tau}{P_\tau} = \frac{(1-a)(1+ic-rc)}{r} - \frac{(1+b)(k\omega+r\phi)}{r(i-\mu+k)} \quad , \tag{42}$$

where ϕ denotes the real wage floor. From time 0 to time τ, W_t and P_t are both growing exponentially at rate i-r, so the deficit equation (7) can be reduced to the following differential equation in debt:

$$\dot{B}_t = [(1+b)\phi - (1-a)(1+ci-cr)]P_0 e^{(i-r)t} + iB_t \quad . \tag{43}$$

The solution is

$$B_t = [(1-a)(1+ci-cr) - (1+b)\phi]\frac{P_0}{r}e^{(i-r)t} + Ce^{it} \tag{44}$$

for some constant C. Real bond holdings will decline during the wage freeze if and only if C is negative. Evaluation of equation (44) at time τ and comparison with (42) shows that C will be negative if and only if

$$\phi < \frac{k\omega}{i-\mu-r+k} \quad . \tag{45}$$

The right-hand side of equation (45) is simply the steady-state real wage. Hence, provided the real wages are frozen at less than the steady-state real wage, and provided the freeze is maintained long enough, it is possible to work off any given monetary overhang.

It is worth emphasizing that the steady-state real wage is not necessarily the wage-to-official-price ratio ("the official real wage") prevailing prior to decontrol. In practice, the unsustainably high level of the latter is the most typical cause of a monetary overhang, so that full indexation on the pre-reform base would prevent stabilization.

5. Monetary adjustments

The basic model assumes that interest rate i is exogenous. One might instead allow i to depend on the inflation rate π. Suppose, for example, that i equals $(1-\epsilon)\pi+s$, where ϵ and s are constants. Since the inflation rate in the model equals i-r, it follows that i equals $[s-(1-\epsilon)r]/\epsilon$ and π equals $(s-r)/\epsilon$. For a given $s > r$, π approaches ∞ as ϵ approaches zero. However, if ϵ equals zero, then r must equal s, and i is undefined. Thus, in the model, pegging i as the sum of the inflation rate and the real discount rate removes an essential anchor, leaving the system indeterminate.

As usual, however, the size of the monetary overhang does not influence the steady-state inflation rate.

Another conceivable monetary adjustment is indexation of bonds (savings deposits) to offset the price surge. This is an odd policy, since the price surge (relative to the long-run equilibrium price) occurs precisely because a monetary overhang must be worked off at the expense of real wages. To index financial wealth would serve to compound the dislocation. Perhaps indexation is intended to counter the distributional impact of wage indexation. A far better policy, however, would be to reduce the indexation of wages without extending it to bonds.

If financial wealth is fully indexed against an initial price surge, stabilization may not be possible. From equation (18),

$$P_0 > \frac{(i-\mu+k)\,rA}{(i-\mu+k)\,(1-a)\,(1+ic)\;-\;(1+b)\,k\omega} \quad . \tag{46}$$

This sets an upper limit to the real financial wealth A/P_0 that can be accommodated without hyperinflation.

One might also allow the currency-to-purchases ratio c to vary inversely with the rate of inflation. However, in the model, the inflation rate after the initial surge is a constant i-r, so stabilization will again depend on flow parameters only. If the magnitude of the initial price shock is posited to permanently reduce c, then a monetary overhang could potentially destabilize the system. In that case, however, a monetary reform to wipe out the overhang would presumably also reduce c, and it is not *a priori* clear why the monetary reform should be less destabilizing than the price surge.

IV. A Special Case when Bond Holdings Are Zero

In the models examined above, savings motives play a crucial role and households are assumed to be able to buy or sell bonds freely without constraints. With a standard, temporally separable utility function, the requirement that households be indifferent at the margin between consumption and saving is stringent. In effect, it forces the inflation rate (apart from an initial price jump) to equal the difference between the nominal interest rate and the real discount rate.

The emphasis on savings may be contested on several grounds. First, it might be argued that households in formerly shortage-ridden economies feel so starved for consumer goods that, once controls are lifted, they will spend all they can. Second, households may seek to unload money and bonds because they fear a return to the old system, a monetary reform, or an acceleration of inflation. Third, households may be eager to convert financial assets into real assets by buying up goods. Fourth, the combination of economic disruption and limited access to credit markets may keep households from either saving or borrowing.

The above arguments may not be persuasive. Nevertheless, it seems worthwhile to pursue their implications, so as to better understand the possible consequences of a monetary overhang. Accordingly, this section analyzes a special case in which households do not save or dissave, and instead hold money solely for transaction purposes.

Again we will assume that real output is constant, and that money velocity is a constant 1/c. There will be no bonds, however: households will spend all they can subject to the cash-in-advance constraint in equation (2). The deficit will now be financed entirely through money creation, so

$$c\dot{P}_t = \dot{M}_t = (a-1)P_t + (1+b)W_t \quad . \tag{47}$$

The wage adjustment equation remains, as before,

$$\dot{W}_t = k\omega P_t + (\mu-k)W_t \quad . \tag{9}$$

Equations (47) and (9) form a system of two linear differential equations, and can be solved in the standard way. P_t and W_t will each be linear combinations of $e^{\upsilon_1 t}$ and $e^{\upsilon_2 t}$, where υ_1 and υ_2 are the eigenvalues of

$$Z \equiv \begin{bmatrix} \frac{a-1}{c} & \frac{1+b}{c} \\ k\omega & \mu-k \end{bmatrix} \quad . \tag{48}$$

The coefficients on the exponential terms are chosen to satisfy the differential equations and the boundary conditions.

It is readily checked that both eigenvalues are real, and that at least one will be non-positive. The other will be positive if and only if the determinant of Z is negative; i.e., if $(1+b)\omega/(1-a)$ exceeds $1-\mu/k$. In particular, it will be positive for $\omega \geq \omega^* = (1-a)(1+ic)/(1+b)$. In the long run, the price and wage inflation rates stabilize at the dominant eigenvalue, regardless of the initial conditions. Moreover, it is readily shown that convergence to the steady-state rate is monotonic. Hence, apart from the initial price jump, inflation should rise gradually to the steady-state rate.

V. Simulation Results

As we have seen, the initial real wage shock in the savings-driven model can be substantial. Simulations may help to indicate the likely order of magnitude of the shock, and also the sensitivity of the shock to various parameters. For the baseline parameters, we picked values that we felt were plausible, but would not attempt a rigorous justification.

The baseline assumes that the government retains 40 percent of the total output for accumulation or unproductive consumption, that transfer payments (including salaries from administrative organizations) are 50 percent of wages, that non-interest-bearing money circulates on average once per quarter, that the household's real discount rate is 3 percent, and that the post-decontrol interest rate is 15 percent. Hence, $a = 0.4$, $b = 0.5$, $c = 0.25$, $r = 0.03$, and $i = 0.15$. In light of the earlier discussion of "reasonable" expectations, we then peg μ at $i-r = 0.12$, and ω at $(1-a)(1+ic)/(1+b) = 0.415$. Provided ω and μ are set in this manner, the results are fairly robust to modest changes in a, b, c, r, and i. Accordingly, we shall examine below variations only in the catch-up parameter k and in households' initial financial wealth A.

Recall from equations (10) and (14) that the real wage approaches the steady-state value at the exponential rate $\mu-i+r-k$, which in this case equals $-k$. Hence, $k = 1$ implies that the gap between the real wage and target ω is reduced by $1-e^{-1}$, or approximately 63 percent, every year. In the simulations, we allow k to vary between 0.25 and 1.5, which implies a yearly reduction of from 22 percent to 78 percent in the real/target wage gap. The baseline is $k=0.5$. 1/

It is helpful to express households' initial money holdings as a multiple of their yearly disposable income $Y = (1+b)W_0$. As Cottarelli and Blejer (1991) have noted, that multiple averaged slightly over 1 for the Soviet Union in the 1980s. Our simulations allow A/Y to range from 0.5 to 5, with a baseline of $A/Y = 1$.

Figure 1 illustrates how initial financial wealth affects real wage movements after price liberalization, when other parameters are held at their baseline values. It shows that the release of even a moderate monetary overhang can cause a substantial shock to real wages. With an initial financial wealth equal to one year's disposable income, the real wage drops 35 percent relative to the long-run value. With an initial financial wealth equal to two years' disposable income, the real wage initially plunges to less than half its long-run value. Most of the shock is dissipated within three to five years.

Figure 2 illustrates how the wage adjustment speed affects real wage movements, again with other parameters held at their baseline values. If $k = 0.25$, the initial real wage shock is barely 20 percent, but it takes three years for the real wage to recover to 90 percent of the long-run value. In contrast, if $k = 1.5$, the initial shock is 60 percent, but after two years the real wage recovers to within 3 percent of its long-run value.

1/ In Poland, when the government liberalized prices in January 1990, the real wage fell by 58 percent in the first two months. By the end of the year, however, the real wage had recovered to 73 percent of its level prior to liberalization (Calvo and Coricelli (1992)). If we assume that the real wage on the eve of price reform was close to the long-run level, and that exogenous wage drift roughly matched inflation, then the k for Poland can be estimated at about 0.5.

Figure 1

Impact of Initial Wealth on Real Wages in a Savings-Driven Model (k=0.5)

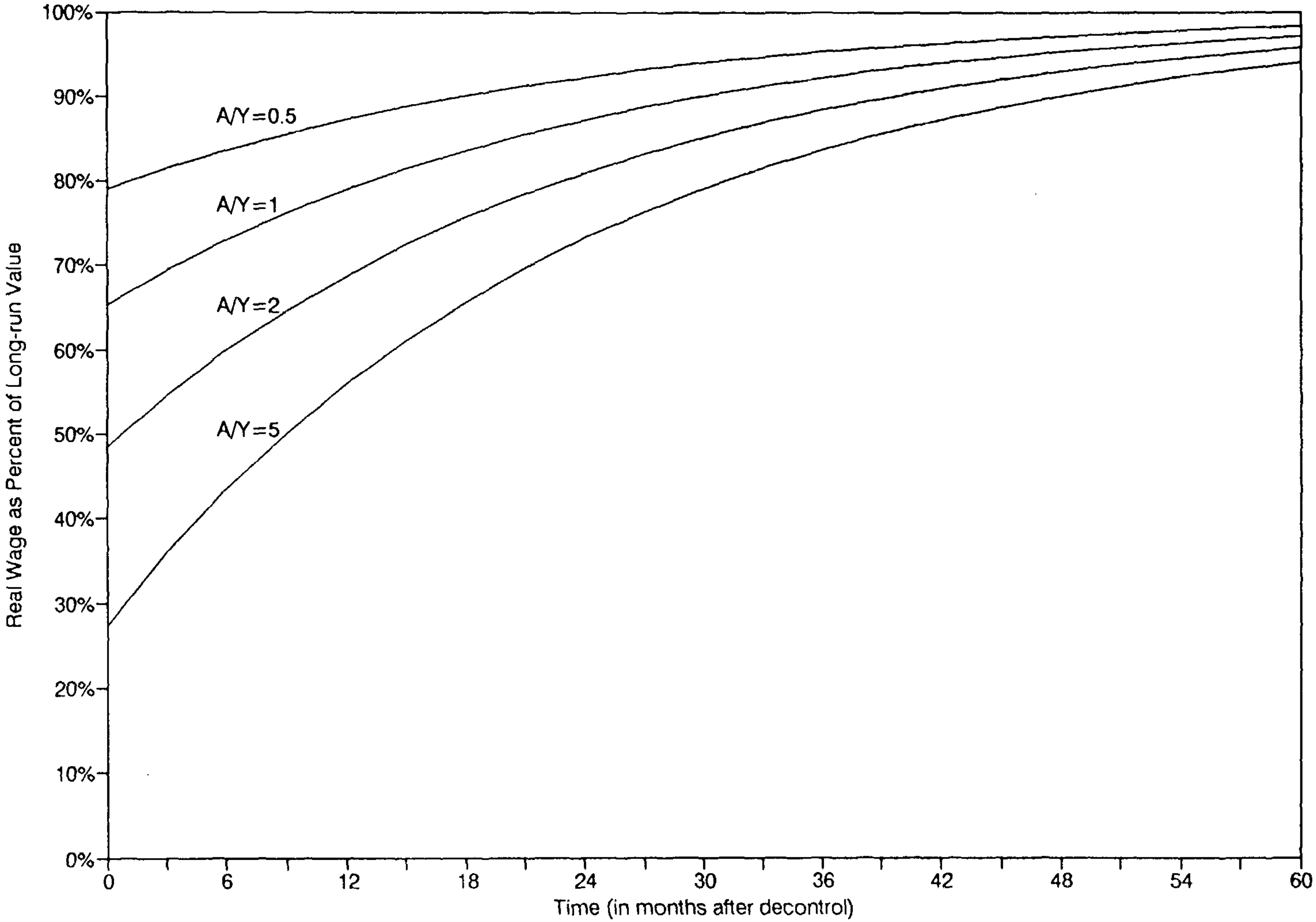


Figure 2

Impact of Adjustment Speed on Real Wages in a Savings-Driven Model (A/Y=1)

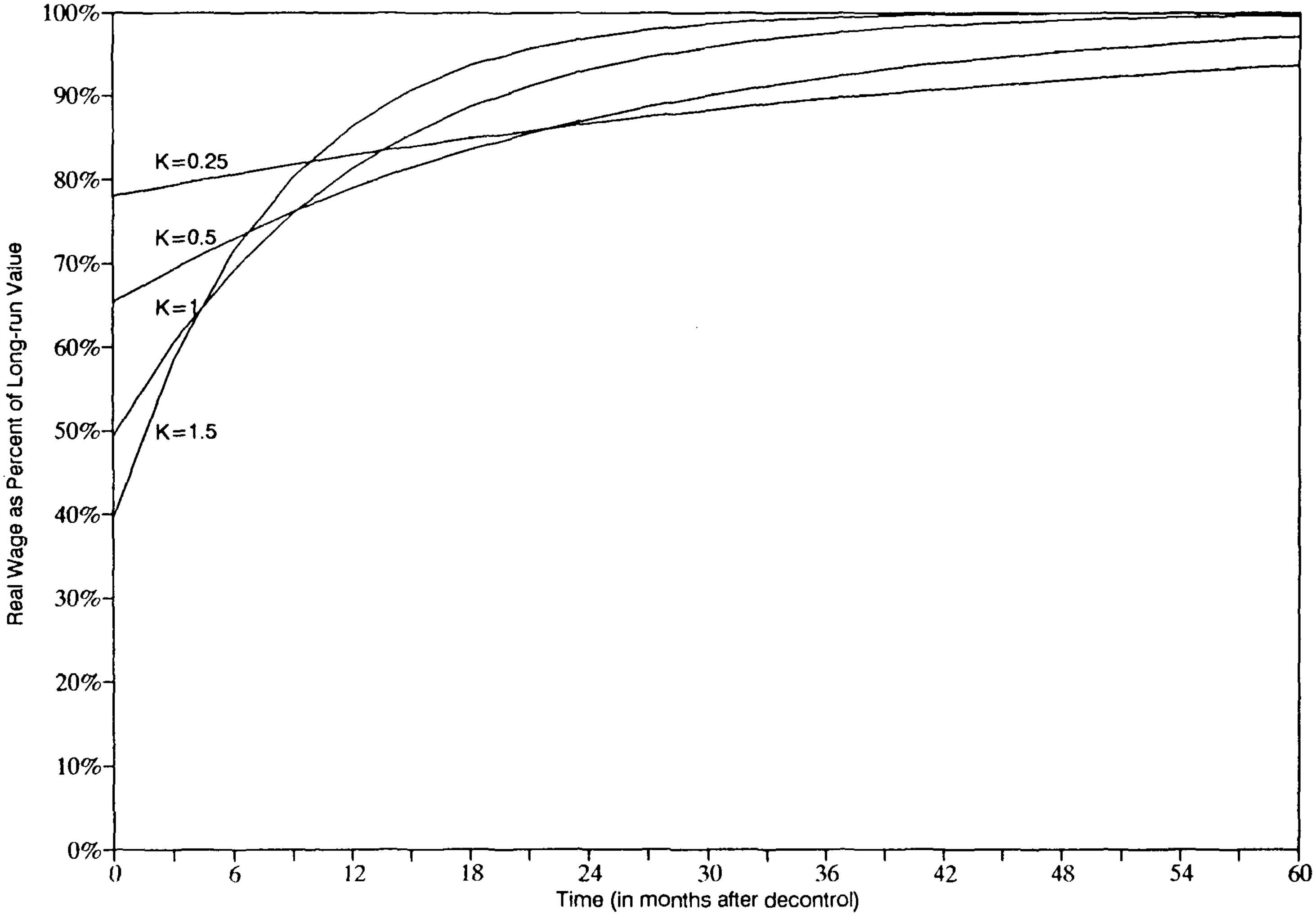


Figure 3

Impact of Velocity of Money on Real Wages in a Transactions-Driven Model

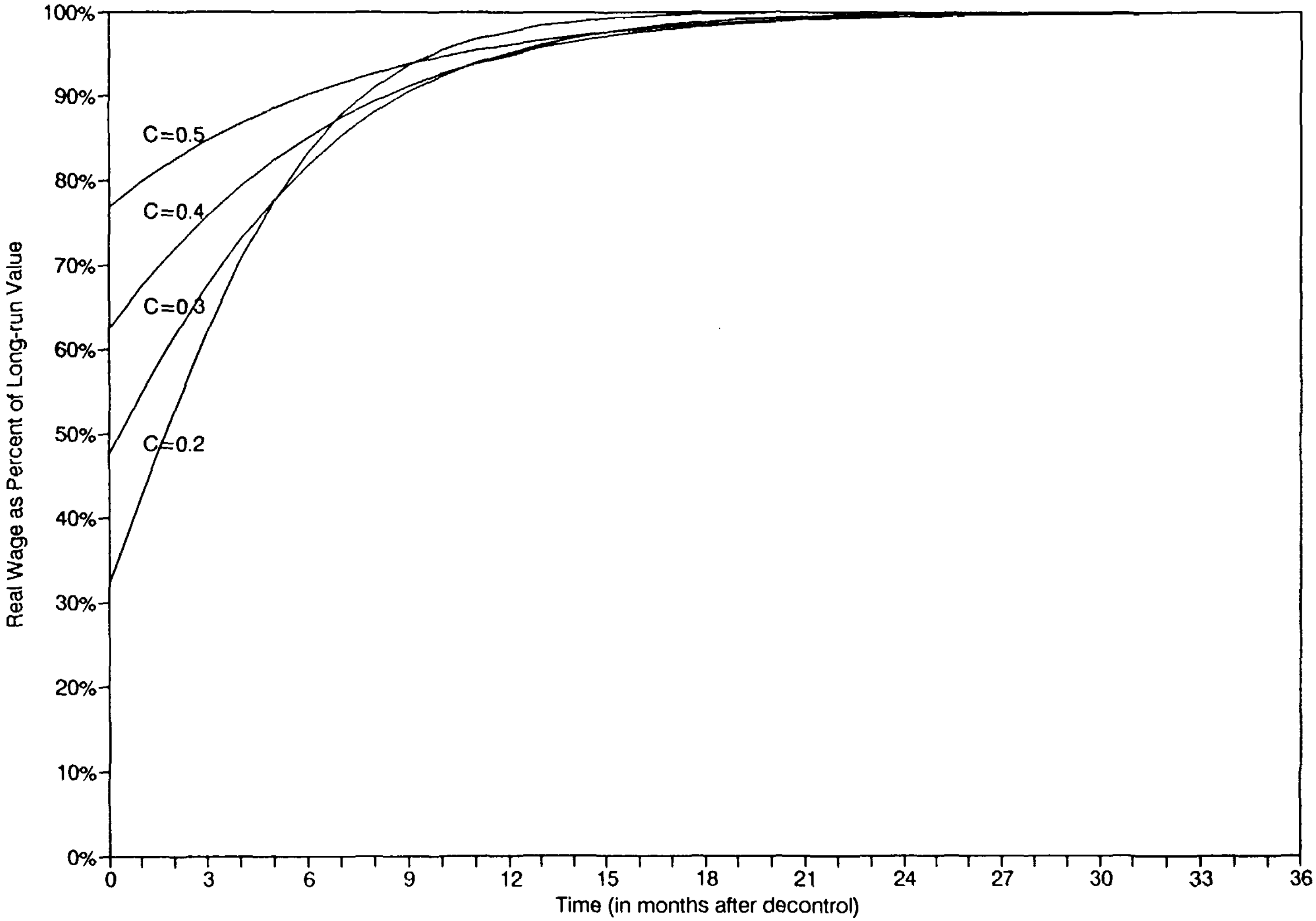
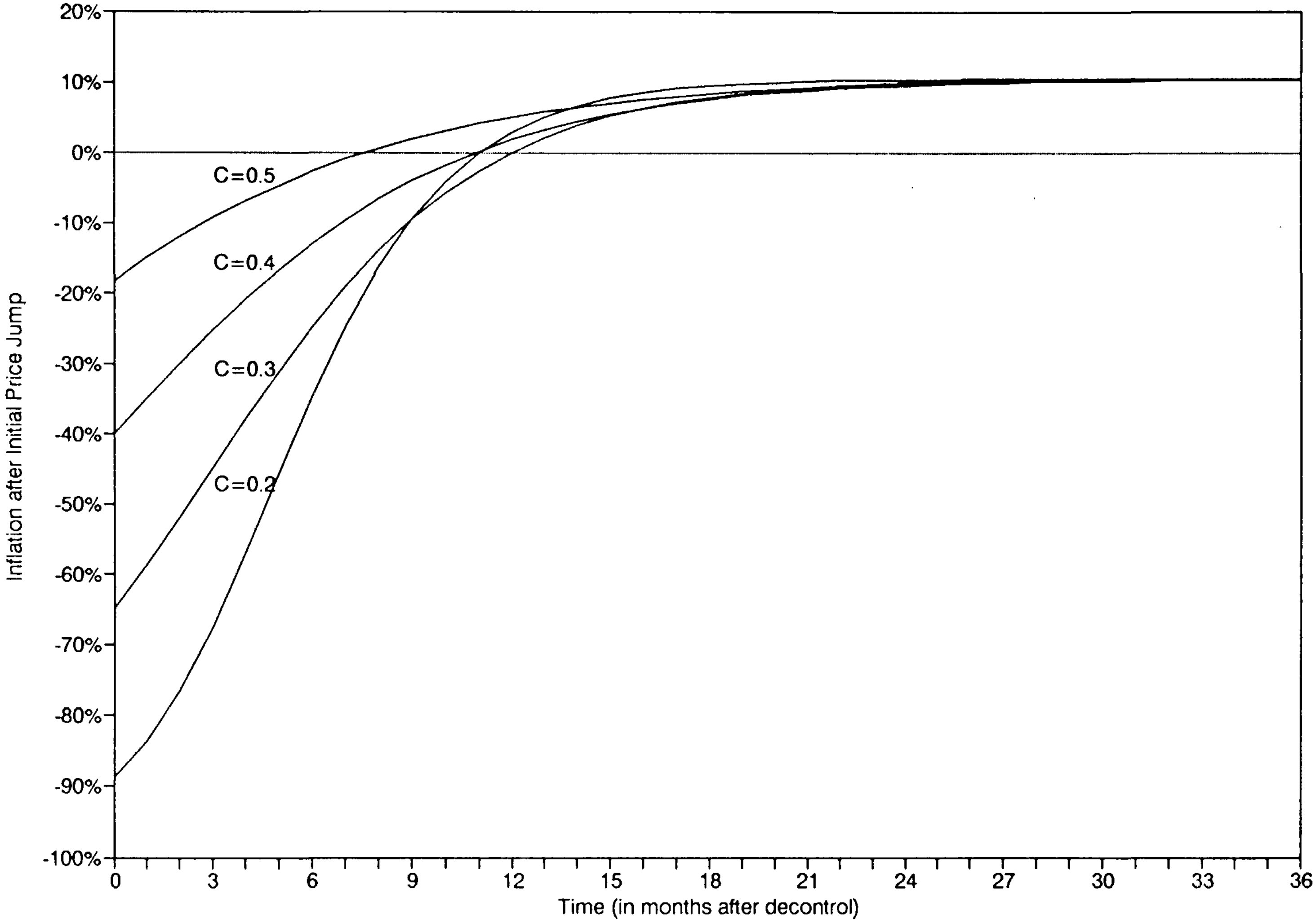


Figure 4

Impact of Velocity of Money on Inflation in a Transactions-Driven Model



As was noted earlier, the accumulation of a large monetary overhang often reflects a wage to official price ratio that is unsustainably high. In that case, the observed fall in real wages attendant to price control will be even larger than that indicated in the figures. To lessen the shock and spread the adjustment burden, it might be helpful to reduce money balances through monetary reform and/or to impose temporary wage controls to slow real wage recovery. However, either of these measures poses a price: the first in terms of reduced public confidence in domestic money, the second in terms of disruption of the labor market.

We next turn to simulations of the transactions-driven model. We keep the baseline parameters the same as before, except for the cash-in-advance ratio c, whose median we raise to reflect the absence of financial assets other than currency. In the transactions-driven model, unlike in the savings-driven model, price and wage movements after decontrol turn out to be extremely sensitive to the velocity of money, so we allow the latter to vary. The velocity range we choose stretches from 2 to 5 (i.e., c varies between 0.2 and 0.5).

Figure 3 illustrates the relation between velocity and real wages in the transactions-driven model. In general, the real wage shock is worse than in the comparable savings-driven model, but recovery is quicker. Thus, if $c = 0.2$, the wage falls initially to one-third its long-run value, and even at $c = 0.5$, the initial shock is over 20 percent, but the recovery is essentially complete within two years. Intuitively, the use of bonds serves to spread out the shock over time, since financial assets are temporarily withheld from circulation.

Figure 4 indicates how velocity in the transactions-driven model affects post-decontrol inflation. The price level jumps immediately after decontrol, but government absorption of the released money dampens subsequent inflation. Indeed, with the parameters chosen, prices decline for the first six months or more after decontrol. With a velocity of 2, prices recede 2 percent in the first month, while with a velocity of 5, prices recede 15 percent in the first month. However, inflation rates rise quickly with the recovery of real wages, and within two years are close to its steady-state rates of approximately 10.5 percent. The long-run inflation rates are fairly insensitive to velocity, although not completely independent of it.

VI. Policy Implications

The findings of this paper offer three main lessons to policymakers. First, the risk that a monetary overhang will catalyze a hyperinflation appears to have been exaggerated. The money stock typically has little influence over whether a country's fiscal, monetary, and labor market policies are destabilizing. High inflation is fundamentally a flow problem, while the monetary overhang pertains to initial stocks and can be neutralized by a one-time price surge. Admittedly, an initial inflation can call forth more inflation, but the responses tend to be damped rather than explosive.

The second lesson is that the initial price surge, and the consequent shock to real wages, can be severe. The real wage compression must allow consumer markets to absorb, over time, not only the initial overhang, but also the subsequent rounds of money and bond emission that are induced by the overhang. To permit future real wages to recover, as required by labor market pressures, present real wages must bear most of the shock. The shock tends to be greater, the larger the initial holdings of cash and bonds, or the weaker the stabilization policies pursued.

The third lesson is that measures to soften the initial wage shock demand careful scrutiny. Emergency social expenditure measures should be limited to the neediest and/or phased out over time. If this is not possible, a monetary overhang may indeed become "too big to work off," unless other stabilization policies are made more stringent. By spreading the adjustment burden over time, temporary wage controls (or reductions in guaranteed indexation) may be particularly helpful in easing the immediate shock. Another possibility is monetary reform, whose merits should be weighed against the likely additional erosion of households' confidence in domestic money.

These theoretical findings appear to be borne out by recent Eastern European experience with price liberalization. The initial price surge quickly gave way to manageable rates of inflation. However, stabilization seems to be endangered, in some countries, by the social and political repercussions of the decline in real wages. These declines have other causes besides the release of a monetary overhang, but presumably the latter would have contributed to instability.

In the former Soviet republics, stabilization appears to be endangered less by the existing monetary stock than by the attempts to peg minimum wages and social benefits at unsustainably high levels. According to the Joint Study's estimates (Vol. 1, p. 396), households' financial holdings in the Soviet Union at the end of 1990 were about 50 percent "too high" relative to consumption flows. Hence, if there were no flow problem, the inflation in retail prices of roughly 150 percent during 1991 would appear to have wiped out the monetary overhang. In reality, the ratio of money holdings to consumption declined much less, largely because of the continuing inflation in wages and social benefits.

Overall, the official real wage in the former Soviet Union appears to have grown by over 50 percent since 1985, while the real supply of consumer goods and services has not substantially improved and in some respects has deteriorated. Upon decontrol, a substantial real wage correction is inevitable. Monetary reform, to reduce the existing money balances, could to some extent soften the shock, and workers might accept adjustment burdens more readily if they feel that others are sharing them. There is, however, a distinct danger that monetary reform will be pursued as a substitute for a real wage correction. In that case, present stabilization efforts could well be frustrated, and future stabilization efforts will begin with even less public confidence in the authorities and in the ruble.

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