# Reassessing the Lopes-Bacha Wage-Indexation Formula

*In memory of Francisco Lopes*

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## Resumo

A lei salarial brasileira reajustava salários nominais em intervalos legalmente fixados, e o próprio intervalo foi alterado — de doze para seis meses em novembro de 1979. Bacha (1980) introduziu uma fórmula de dois períodos em que os pesos h e 1−h medem quanto os salários acompanham preços correntes e passados. Lopes e Bacha (1983) amarraram esses pesos ao intervalo legal de reajuste por meio de um argumento em tempo contínuo. Este artigo mostra que a amarração exige menos: o peso sobre a inflação defasada é a idade média dos salários vigentes. A derivação supõe inflação constante e periodicidade inalterada — condições que novembro de 1979 viola.

**Palavras-chave:** indexação salarial; inflação inercial; política salarial; Brasil; análise de período.

**Classificação JEL:** E31; E24; J38; N16.

## Abstract

Brazilian wage law reset nominal wages at legally fixed intervals, and the interval itself was changed — from twelve months to six in November 1979. Bacha (1980) introduced a two-period formula in which the weights h and 1−h measure how far wages follow current and past prices. Lopes and Bacha (1983) tied those weights to the legal readjustment interval, deriving the tie from a continuous-time argument. This paper shows the tie needs far less: the weight on lagged inflation is the average age of wages in force. The Lopes-Bacha derivation assumes constant inflation and unchanged periodicity — conditions the 1979 episode violates.

**Keywords:** wage indexation; inertial inflation; wage policy; Brazil; period analysis; Lopes–Bacha model.

**JEL classification:** E31; E24; J38; N16.

## 1. Introduction[1]

Lopes and Bacha (1983) built a growth-inflation model around a distinctive feature of the Brazilian economy: compulsory wage policy, which reset nominal wages for all registered workers at legally fixed intervals. To represent that policy inside the model, they introduced a wage-indexation formula whose two components were in fact developed at different times and carry different content. The functional form is that of Bacha (1980), whose equation (10) writes the nominal wage as a geometric

[1] The algebraic derivations in the Appendix and their numerical verification were developed in dialogue with Claude (Anthropic) and ChatGPT. The argument of the paper, the historical framing and the interpretation of the 1979–80 episode are the author's own.

weighted average of the current and the preceding price level, $w = vP^{h}P_{-1}^{1-h}$ with $0 \le h \le 1$, and whose equation (15) gives the corresponding rate version. In log changes,

$$\hat{w}_t = h\pi_t + (1-h)\pi_{t-1}. \qquad (1)$$

Here $\hat{w}_t$ is the log change in the nominal wage between periods t−1 and t, and $\pi_t$ the log change in the period-average price level. In this formulation h is a free parameter measuring the responsiveness of wages to current as against past prices — in effect, the capacity of labor to resist the erosion of real wages by inflation. That paper reads a wage squeeze as a fall in h, without tying that fall to any particular institutional mechanism.

What Lopes and Bacha (1983) add is precisely such a tie. Their contribution is to give h institutional content by relating it to the legally fixed interval between wage settlements: with n readjustments per period of analysis, $h = 1 - 1/(2n)$[2]. This is not a restatement of the 1980 parameter but a different and stronger claim about it, and it is what makes the compulsory wage law representable inside the model. The derivation offered for the tie runs through the continuous-time construction reproduced in the Appendix.

The setting that gave the formula its point was Brazil's compulsory wage law, in force from 1965, which reset nominal wages for all registered workers at legally fixed intervals. The statutory formula was never simple indexation to past inflation alone: from the outset it combined a backward-looking term with a coefficient for expected residual inflation, later subject to correction for past errors, and was reformulated repeatedly. Those details do not matter here and are set out in Simonsen (1995) and Carvalho (1982). What matters is the one feature the formula is built to represent: wages were reset at a legally fixed periodicity, and that periodicity was itself a policy instrument.

Law 6.708 of October 1979 shortened the interval from twelve months to six, taking effect in November of that year, at the same time as the second oil shock was feeding into Brazilian costs. LaraResende and Lopes (1981) argued that that shortening contributed materially to the inflationary acceleration that followed. Their argument, and the wider claim that Brazilian inflation was largely inertial, became the analytical core of the literature that led to the heterodox-shock stabilization proposals of the mid-1980s — largely through Lopes's own work, collected in Lopes (1986).

Lopes and Bacha’s (1983) derivation gives the calibration a strong status. It considers workers whose wages are reset at staggered dates, allows real wages to decline between settlements as prices rise, and aggregates across workers, arriving at $h = 1 - 1/(2n)$ as the aggregate implication of their continuous-time construction. The paper states explicitly that the aggregation rule is an approximation, exactly true in its construction only under a constant rate of inflation. It then uses the calibrated formula throughout its model of inflation, growth and wage policy.

The question this paper asks is how much of that apparatus the calibration actually requires. The answer is: less than the 1983 derivation deploys. The same value of h follows from an elementary timing argument about the average age of wages in force, set out in Section 2.2, which needs neither constant inflation nor the exact integration of individual wage paths. The formula can therefore be retained as a stylized period-analysis representation of compulsory wage indexation. It is

[2] The functional form of equation (1) comes from a working-paper of November 1979, published as Bacha (1980). Working from that text, Lopes developed the connection to compulsory wage policy and derived $h = 1 - 1/(2n)$, which is already present in Lopes and Bacha (1980), the October 1980 working-paper version of their joint article.

institutionally calibrated but it does not claim to reproduce the continuous-time wage path of any individual worker.

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The distinction matters because the calibration and the aggregation argument are related but separable propositions. The Appendix reexamines the second and finds that it holds under conditions narrower than the paper states: constant instantaneous inflation across the relevant two-period window, and an unchanged settlement periodicity. The Appendix contains this paper's main technical result: when the constant-inflation assumption is relaxed, the continuous-time aggregation yields two correction terms, one associated with changing inflation along individual wage paths and the other with the staggering of settlement dates. The finding narrows the scope of the exact-equivalence claim while leaving the calibration, and with it the substantive results of the model, intact. In particular, the two uses examined in Section 3 — the forced-saving level relation and the inflation difference equation — follow directly from the stylized representation and are unaffected by the narrowing. What the narrowing does affect is the claim that the formula can describe what happens when the periodicity itself changes: that is a regime comparison, not a transition path, and the difference is set out in Section 4.

## 2. The formula as a period-analysis representation

### 2.1 Period analysis

Period analysis here means simply that the model works with period averages rather than continuous time: $p_t$ and $w_t$ are the average price level and average nominal wage during period t, and $\pi_t$ and $\hat{w}_t$ their log changes between successive periods. The formula is not a statement about any individual worker's wage at every instant, and on the reading adopted here no underlying continuous-time path of prices need be posited at all. $\pi_t$ and $\hat{w}_t$ are observable period variables, and equation (1) is a device for summarizing how the statutory frequency of readjustment affects the timing with which wages follow prices. The Appendix, which reconstructs the original continuoustime argument, works with a finer notion of the inflation rate; it is introduced there.

### 2.2 Calibrating h: from bargaining power to settlement frequency

The tie between h and the settlement interval rests on a timing argument that can be stated in two steps. The first concerns the formula. Equation (1) is a distributed lag with just two terms: weight h on inflation of the current period, dated t, and weight 1−h on inflation of the preceding period, dated t−1. The mean lag of any distributed lag is the weighted average of the lags themselves, so here it is $h \cdot 0 + (1-h) \cdot 1 = 1-h$ periods. The coefficient on lagged inflation is thus not merely a weight: it is the average delay, measured in periods, with which wages follow prices.

The second step concerns the institution. Suppose wages are reset n times during each period of analysis, so that the interval between two successive settlements of the same worker is 1/n of a period and suppose settlement dates are spread evenly across the calendar rather than concentrated on a single date. This is how Brazilian wage law in fact operated, settlement dates differing across industries and occupational categories. At any moment, a worker drawn at random is somewhere between his last settlement and his next, with all positions equally likely; the average elapsed time since his last readjustment, and hence the average age of the wage then in force, is half the interval, or $1/(2n)$ of a period. Since that average age is exactly the delay with which the aggregate wage reflects prices, the two magnitudes must coincide:

$$1 - h = 1/(2n), \quad \text{or} \quad h = 1 - 1/(2n). \qquad (2)$$

Thus h = 1/2 under annual readjustment when the period of analysis is one year, h = 3/4 under semiannual readjustment, and h approaches unity as the settlement interval becomes arbitrarily short — full indexation in the limit.

Two qualifications should be stated precisely. First, the argument calibrates h conditional on the twoperiod weighted form; it does not derive that form, which is taken from Bacha (1980). What it supplies is an institutional value for a coefficient whose functional role is given in advance. Second, the argument is not wholly independent of the continuous-time construction: the step from "n settlements per period" to "mean age 1/(2n)" uses the even spread of settlement dates across the calendar, which is also the staggering premise of the aggregation argument in the Appendix[3]. What the timing argument dispenses with is the rest of that apparatus: the assumption of a constant instantaneous rate of inflation, the exact integration of individual sawtooth wage paths, and the auxiliary identity between end-to-end and period-average inflation discussed in Section A.2. It requires less than the full continuous-time derivation, and it is that difference which matters here, since it is those additional ingredients that fail when inflation or periodicity changes.

### 2.3 In what sense stylized

The formula is stylized in a precise sense. It is meant to reproduce, at the level of period aggregates, the effect of an indexation rule operating at a given frequency; it is not meant to reproduce the wage path of any particular worker. At the limiting cases, h = 1 gives full contemporaneous adjustment and h = 0 a one-period lag, with intermediate values interpolating between them. This is what allows a continuous parameter to stand for settlement intervals that need not be whole periods.

This separates two questions that are easily conflated. The first is whether equation (1) usefully represents the effect of an institutional readjustment frequency. The second is whether it can be derived exactly by aggregating individual continuous-time wage paths. The first can be accepted without the second.

## 3. The two uses of the formula in Lopes and Bacha

Once equation (1) is read as a stylized period representation, the two uses made of it in the original model can be understood without attributing to it a stronger microeconomic status than its derivation supports.

### 3.1 The wage-level relation and forced saving

Integrating equation (1) over time gives the corresponding level relation

$$\ln w_t = \ln v^* + h \ln p_t + (1-h) \ln p_{t-1}, \qquad (3)$$

where $v^*$ is a constant real-wage benchmark. Since the average real wage is $\bar{v}_t = w_t/p_t$, equation (3) gives directly

[3] The case of non-uniform distributions is treated in Lopes (1984), who arrives at a more general formula that contains equation (1) as a special case.

$$\ln \bar{v}_t = \ln v^* - (1-h)\pi_t. \quad (4)$$

At a given rate of inflation, less complete indexation — a smaller h, that is, a longer settlement interval — lowers the average real wage. Through the distribution of income between wages and profits, this is the forced-saving channel emphasized by Lopes and Bacha, and the basis of the capacity-growth schedule in their model. Nothing in the present reinterpretation disturbs this use of the formula.

### 3.2 The dynamic relation and inflation

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The formula is also used dynamically. Lopes and Bacha combine it with a Phillips-type price equation,

$$\pi_t = \hat{w}_t + j(u_t - \bar{u}), \quad (5)$$

where $u_t$ is capacity utilization, $\bar{u}$ its normal level, and j the response of inflation to excess utilization. Substituting (1) into (5) gives $(1-h)(\pi_t - \pi_{t-1}) = j(u_t - \bar{u})$, and therefore

$$\pi_t - \pi_{t-1} = [\, j/(1-h)\,](u_t - \bar{u}) = 2nj(u_t - \bar{u}). \quad (6)$$

This is the inflation difference equation of the Lopes-Bacha model: inflation accelerates when the economy operates above normal capacity utilization, and the coefficient on the utilization gap rises with the frequency of wage readjustment. On the present reading, equation (6) is an internally consistent consequence of the period representation, and 2nj remains the correct multiplier: the stylized substitution of (1) into (5) is exact within period analysis and does not require the continuous-time aggregation to be valid. What is no longer claimed is that equation (1), when inserted in (5), has been independently established as the exact aggregate counterpart of the continuous-time wage-setting process — the stronger proposition examined in the Appendix.

The parameter h is what carries the wage rule into the model. A change in the statutory frequency of readjustment changes h and therefore changes both the wage-level relation and the coefficient in the inflation difference equation. Comparative statics in h is thus not an incidental use of the formula but its purpose, which is why the question taken up next — what the formula can say when the periodicity changes — is the central test of the representation rather than a peripheral qualification.

## 4. A change in periodicity: what can and cannot be represented

The stylized interpretation draws an important distinction between comparing two institutional regimes and describing the transition from one to the other.

Suppose two regimes differ only in settlement frequency, with parameters $h_{old}$ and $h_{new}$, and consider the same price path. From equation (3), the difference in nominal wage levels is

$$\ln w_{new} - \ln w_{old} = (h_{new} - h_{old})\pi_t. \quad (7)$$

Equation (7) is a difference between wage levels under two institutional regimes. It is not a difference between their rates of wage growth. Indeed, within either regime, constant inflation implies $\hat{w} = h\pi + (1-h)\pi = \pi$, independently of h. The settlement frequency affects the nominal wage level associated with a given price path, but not the rate of nominal wage growth along it.

The distinction matters for interpreting the change from annual to semiannual readjustment in November 1979, which the numerical illustration of Section 5 uses as its stress test. The period formula can compare the two regimes at a common inflation rate. It does not, by itself, describe the actual transition: that would require a cohort model tracking each group of workers from its position in the old settlement cycle — some mid-cycle, some recently reset — through its first settlement under the new rule. Whether such a calculation would materially change the magnitude of the regime comparison in Section 5 is an open question, not one this paper resolves.

This is a limitation of scope, not a defect in the representation. The formula was designed to summarize the effect of an indexation frequency in period analysis, not to track individual settlement dates through a legal change.

## 5. A numerical illustration: Brazil, 1978–80

A simple illustration clarifies the distinction between wage levels and wage-growth rates. Take annual inflation of approximately 40 percent in 1978, 77 percent in 1979 and 110 percent in 1980. Because the equations are written in logarithms, the corresponding log rates are about 0.336, 0.571 and 0.742. For annual readjustment $h = 0.50$; for semiannual readjustment $h = 0.75$. Evaluating the two regimes at the 1979 rate gives $(0.75 - 0.50)(0.571) \approx 0.143$ log points, a multiplicative difference of $\exp(0.143)-1$, or roughly 15 percent. Holding the price path and other determinants fixed, the semiannual regime implies a nominal wage level about 15 percent higher than the annual regime at that inflation rate.

This should not be read as saying that semiannual readjustment raises wage inflation by 15 percentage points. Within either regime, if inflation is constant, nominal wage growth equals the inflation rate. The 15 percent figure is a level comparison between stationary regimes, not a description of what happened in the months following November 1979.

The appendix correction terms of Section A.2 can also be evaluated on the same numbers. Taking $n = 1$ and the log rates as end-to-end approximations, the first-difference term $-\Delta\hat{q}/(2n)$ contributes roughly $-0.085$ log points and the staggering term $\Delta^2\hat{q}/(6n^2)$ contributes roughly $-0.011$, for a total of about $-0.096$ log points relative to $\pi_t$. The notable feature of this illustration is that most of the correction comes from the first-difference term — the effect of a changing inflation rate on each worker's own path — and not from the aggregation across staggered workers. The staggering correction is small here because Brazilian inflation over 1978–80 was accelerating at a decelerating pace; it would be larger in an episode with a sharper kink in the inflation path.

The dynamic implication is separate. Since $j/(1-h) = 2nj$, moving from annual to semiannual readjustment changes the coefficient on the utilization gap from $2j$ to $4j$: for a given excess of utilization over its normal level, the model predicts twice the inflation acceleration under the semiannual rule. This gives a formal mechanism consistent with the argument of Lara-Resende and Lopes (1981) that the November 1979 change contributed to the subsequent acceleration. It is a comparison of model regimes, not a reconstruction of the months through which the economy actually moved from one rule to the other.

## 6. Conclusion

The wage-indexation formula of Bacha (1980) and Lopes and Bacha (1983) can be retained without treating it as an exact representation of the continuous-time wage-setting mechanism. Its appropriate status is that of a stylized period-analysis representation of compulsory wage indexation. Once the two-period weighted form is adopted, its parameter has a simple institutional calibration: $1-h$ is the mean lag of wages behind prices, and that mean lag is half the settlement interval.

This reading preserves both roles the formula plays in the original model. Integrated over time, it yields the wage-level relation underlying the forced-saving mechanism. Combined with the price equation, it yields the inflation difference equation in which the frequency of readjustment governs the speed of inflationary acceleration. This is the result that gave analytical content to the claim that Brazilian inflation was propagated by its own indexation arrangements.

What this paper narrows is the stronger claim that the formula is exactly equivalent to an aggregation of individual continuous-time wage paths under all circumstances of interest. Reexamining that aggregation shows that when the inflation rate changes, additional terms arise from the history of inflation and from the staggering of settlement dates; and that when the periodicity itself changes, the stationary distribution of settlement dates is lost during the transition.

These qualifications do not invalidate the formula. They clarify what it is — a parsimonious, institutionally calibrated representation well suited to period analysis — and what it is not: a cohort model capable of reconstructing the detailed adjustment following a change in wage legislation. That reinterpretation seems preferable either to abandoning the formula or to attributing to it a microeconomic exactness its derivation does not support.

## Appendix. Reexamining the continuous-time aggregation argument

The Appendix of Lopes and Bacha (1983) provides the continuous-time rationale for equation (1). A representative worker's log real wage is taken to fall linearly between settlements as prices rise; workers have staggered settlement dates; and the aggregate real wage is obtained by averaging over those dates. Their Figure 1, reproduced below, sets out the construction. The paper itself notes that the aggregation rule is an approximation, exactly true in its construction only under a constant rate of inflation.

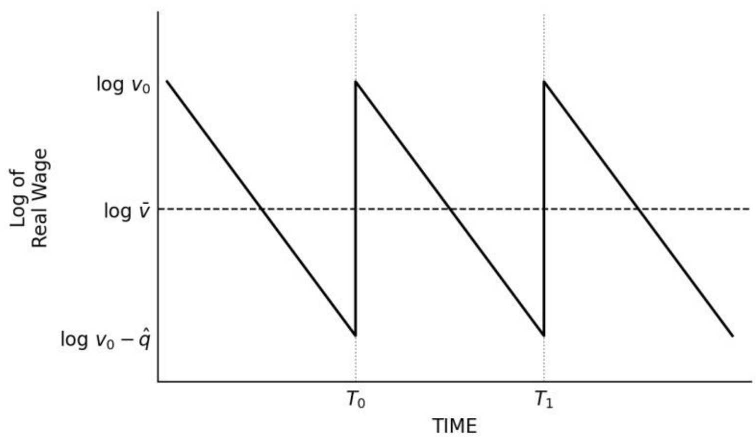


Figure 1

### A.1 Notation

Let z be the length of the period of analysis and let a worker's settlement date be T+x, with x uniformly distributed on [0,z). Reconstructing the original argument requires positing a continuous path for the price level, and with it two distinct summary measures of inflation over a period. Let q̂ denote the log change in the price level from the beginning to the end of a settlement interval, and π the rate measured between the average price levels of successive periods. Both summarize the same underlying path, but differently: q̂ uses only its two endpoints, discarding whatever happens in between, while π averages price levels over each full period. Where the instantaneous rate of inflation is constant, the path is a straight line in logs and the two measures coincide. This is why the distinction plays no part in the original construction, conducted throughout under that assumption. Where the rate varies, the averaging behind π assigns weight to portions of the path that the endpoint comparison ignores, and the two diverge by an amount that depends on the path's shape. The distinction is what makes the correction terms below irreducible.

### A.2 A change in the inflation rate

Suppose the instantaneous inflation rate is $s_0$ before the beginning of the period and $s_1$ thereafter, so that $\hat{q}_0 = s_0 z$ and $\hat{q}_1 = s_1 z$ are the corresponding end-to-end rates. In the construction of Figure 1 the real wage of each worker is restored at every settlement to a common peak $v_0$ and declines steadily from there until the next settlement; write V(x) for the average of the log real wage over the period, taken across the path of a worker whose settlement date is displaced by x from the period boundary. Exact integration of that path, within the log-linear wage-decay representation used by the paper, gives

$$V(x) = \ln v_0 - \hat{q}_1/2 + [x(z-x)/z^2](\hat{q}_1 - \hat{q}_0). \qquad \text{(A1)}$$

The second term captures the fact that workers who enter the period away from their own settlement date carry some erosion inherited from the previous inflation regime. Averaging over a uniform distribution of x gives $E[x(z-x)/z^2] = 1/6$. With n readjustments per period, only the first of the n subcycles straddles the change in the inflation rate; repeating the calculation and aggregating gives

$$\ln \bar{v}_t = \ln v_0 - \hat{q}_t/(2n) + (\hat{q}_t - \hat{q}_{t-1})/(6n^2). \qquad \text{(A2)}$$

Since $\ln w = \ln \bar{v} + \ln p$, differencing between periods yields

$$\hat{w}_t = \pi_t - \Delta\hat{q}_t/(2n) + \Delta^2\hat{q}_t/(6n^2). \qquad \text{(A3)}$$

Equation (A3) follows algebraically from the log-linear representation of real-wage decay used in the paper; no additional approximation is introduced at this stage. It contains two correction terms relative to $\pi_t$. The first-difference term reflects the effect of a changing inflation rate on the representative worker's own wage path and would arise even if all workers were synchronized. The second-difference term is the genuinely aggregation-related component, arising from the heterogeneity of settlement dates.

Equation (A3) is stated in $\hat{q}$, whereas the formula of the text is stated in π. Passing from one to the other requires the auxiliary aggregation rule introduced as equation (6) of Lopes and Bacha (1983), which asserts that the change in the inflation rate is the same whether measured from period averages or from end-of-period values:

$$\pi_t - \pi_{t-1} = \hat{q}_t - \hat{q}_{t-1}. \qquad \text{(A3}'\text{)}$$

Applied to (A3), this identity converts the correction terms into differences of π and allows them to be absorbed, returning equation (1). But the original paper introduces (A3′) with the explicit warning that it "is strictly valid only in the case of constant inflation", the same restriction it attaches to the aggregation rule itself. The elimination of the correction terms therefore rests on precisely the assumption whose relaxation generated them.

The reason there is no weaker substitute is that $\hat{q}$ and π are different objects once inflation varies.

The end-to-end rate $\hat{q}_t$ compares the price level at two dates; the period-average rate $\pi_t$ compares two averages, each formed over a whole period. Under a constant instantaneous rate the two coincide, which is why the distinction is invisible in the original construction. When the rate changes within or between periods, the averaging assigns weight to parts of the price path that the end-toend comparison ignores, and the two measures diverge by an amount that depends on the shape of the path. Both remain functionals of the same underlying price series, so they are not unrelated; what is unavailable is a relation between them holding period by period, of the kind (A3′) asserts. Equation (A3) is therefore the defensible terminal form of the aggregation calculation.

The magnitudes involved can be read off the illustration of Section 5. Take n = 1 and treat the log rates given there as end-to-end rates: $\hat{q}_{1978} = 0.336$, $\hat{q}_{1979} = 0.571$, $\hat{q}_{1980} = 0.742$. The first difference is $\Delta\hat{q}_{1980} = 0.742 - 0.571 = 0.171$, so the first-difference term contributes $-\Delta\hat{q}/2 \approx -0.085$ log points. The second difference is $\Delta^2\hat{q}_{1980} = 0.742 - 2(0.571) + 0.336 = -0.064$, so the staggering term contributes $\Delta^2\hat{q}/6 \approx -0.011$. Together they put the full correction to $\pi_t$ at roughly $-0.096$ log points.

The aggregation-related component is thus about one-ninth of the whole. Its small size measures only the mildness of the curvature in the Brazilian inflation path over these years — inflation was accelerating, but at a decelerating pace — and should not be mistaken for the size of the correction that a changing inflation rate generates.

## A.3 A change in periodicity

The aggregation argument presupposes something further: that settlement dates are distributed uniformly across the calendar under the periodicity in force. That uniformity is what gives the averaging of the previous section its meaning — it is the premise behind $E[x(z-x)/z^2] = 1/6$ — and it is a property built up over time under a given rule, not one that holds automatically.

Consider first what the calculation yields if the property is granted. Applying (A2) to two consecutive periods, each with its own periodicity — $n_t$ in period t and $n_{t-1}$ in period t−1 — and differencing as before gives

$$\hat{w}_t = \pi_t - \hat{q}_t/(2n_t) + \hat{q}_{t-1}/(2n_{t-1}). \qquad \text{(A4)}$$

The two $\hat{q}$ terms now carry different denominators. They can no longer be collected into the single difference $\hat{q}_t - \hat{q}_{t-1}$ on which the auxiliary identity (A3′) operates, so the route back to equation (1) is closed at once, before the question of the correction terms of Section A.2 even arises.

But (A4) rests on a premise that a change in the rule violates. Each of its two terms was derived for a population already settled into uniform staggering under its own periodicity. Immediately after a legal change, no such population exists: some workers still carry settlement dates inherited from the old rule while others have already been reset under the new one, and the cross-section is uniform under neither. (A4) is therefore a comparison between two hypothetical stationary regimes, not a description of the periods spanning the change.

The continuous-time calculation thus does not describe the transition from one periodicity to another. This is the same conclusion reached in Section 4 by a different route, and the reason it is presented there as a limitation common to both readings of the formula.

## A.4 What this Appendix changes

The aggregation argument thus supports a narrower equivalence claim than the original paper suggests. For the particular calculation developed there, constant instantaneous inflation over the relevant two-period window is required, and the periodicity must remain unchanged. When either condition fails, the aggregate wage relation contains terms not present in equation (1).

Lopes (1984) extends the aggregation argument of Lopes and Bacha (1983) to allow non-uniform distributions of settlement dates, arriving at a more general wage-growth equation that contains equation (1) as a special case. That extension enriches the original paper's derivation but does not alter the conclusion here. The conditions identified above as necessary for the equivalence between the period formula and the continuous-time wage-setting process apply to Lopes (1984) as well: its conclusions section explicitly retains constant inflation within each period as the single simplifying hypothesis of the construction, and it notes that when the periodicity changes, the uniform distribution of settlement dates is no longer stable across periods.

The refinement here of the continuous-time aggregation result is not a rejection of the period formula. Establishing that the formula has a microfoundation at all is what gave it theoretical standing, and the question of how far that microfoundation extends could not have been posed had the demonstration never been attempted. The formula's institutional parameter can be calibrated from the mean lag implied by the settlement frequency without invoking the aggregation argument at all. The Appendix therefore limits the scope of the derivation rather than the usefulness of the representation employed in the body of the paper.

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