

Phillips, Euler, and Measurement in Macro

CfM - Persistent Puzzles and Paradoxes in Economics: Are Radical Paradigm Changes on the Horizon?

François Geerolf

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Section 1

Introduction

Three themes

3 equation model:

$$\begin{cases} \pi_t = \beta E_t[\pi_{t+1}] + \kappa x_t \\ x_t = E_t[x_{t+1}] - \frac{1}{\sigma}(i_t - E_t[\pi_{t+1}] - r_t^n) \\ i_t = \phi_\pi \pi_t + \phi_x x_t \end{cases}$$

- **The Phillips curve:** unemployment, inflation expectations... or more importantly, exchange rates ?
- **The Euler equation:** don't nominal rates matter more than real rates ? for households (mortgages), firms (regulation), governments (budget rules) ? Nominal matters without sticky prices ?

Even more fundamentally, issues with macroeconomics and measurement:

- **Measurement of inflation, GDP, productivity:** from micro to macro. What do National Statistical Institutes really do ? Focus on inflation measurement, and aggregating up to compute GDP / Real GDP...

Section 2

Phillips curves ?

Talking about paradigm change...

- No paradigm change in macro after 2007-09. According to Krugman (2018), there should have been one on the Phillips curve:

Good enough for government work? Macroeconomics since the crisis

Paul Krugman*

IV. The case of the missing deflation

I've just argued that the lack of a major rethinking of macroeconomics in the aftermath of crisis was reasonable, given that conventional, off-the-shelf macroeconomics performed very well. But this optimistic assessment needs to be qualified in one important respect: while the demand side of economy did just about what economists trained at MIT in the 1970s thought it would, the supply side didn't.

As I said, the experience of stagflation effectively convinced the whole profession of the validity of the natural-rate hypothesis. Almost everyone agreed that there was no long-run inflation-unemployment trade-off. The great saltwater-freshwater divide was, instead, about whether there were usable short-run trade-offs.

But if the natural-rate hypothesis was correct, sustained high unemployment should have led not just to low inflation but to continually declining inflation, and eventually deflation. You can see a bit of this in some of the most severely depressed economies, notably Greece. But deflation fears generally failed to materialize.

Phillips' original paper

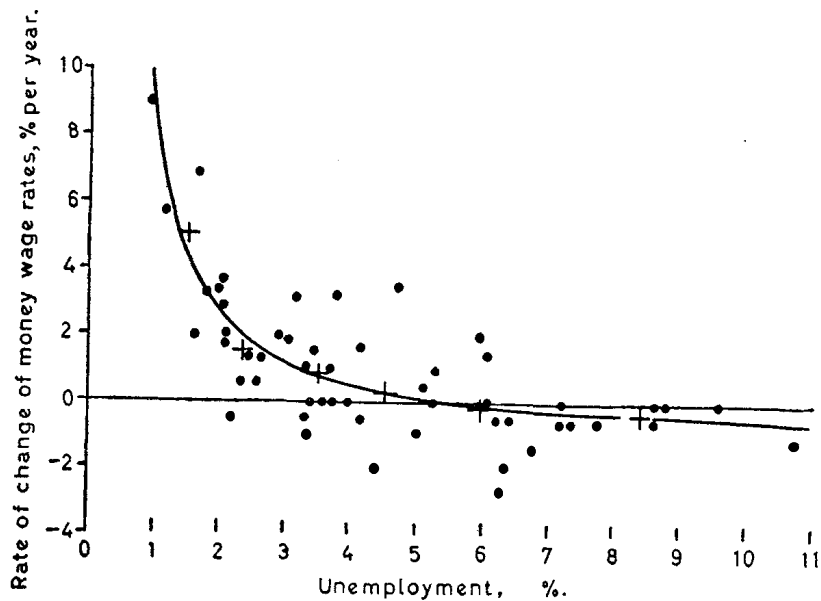
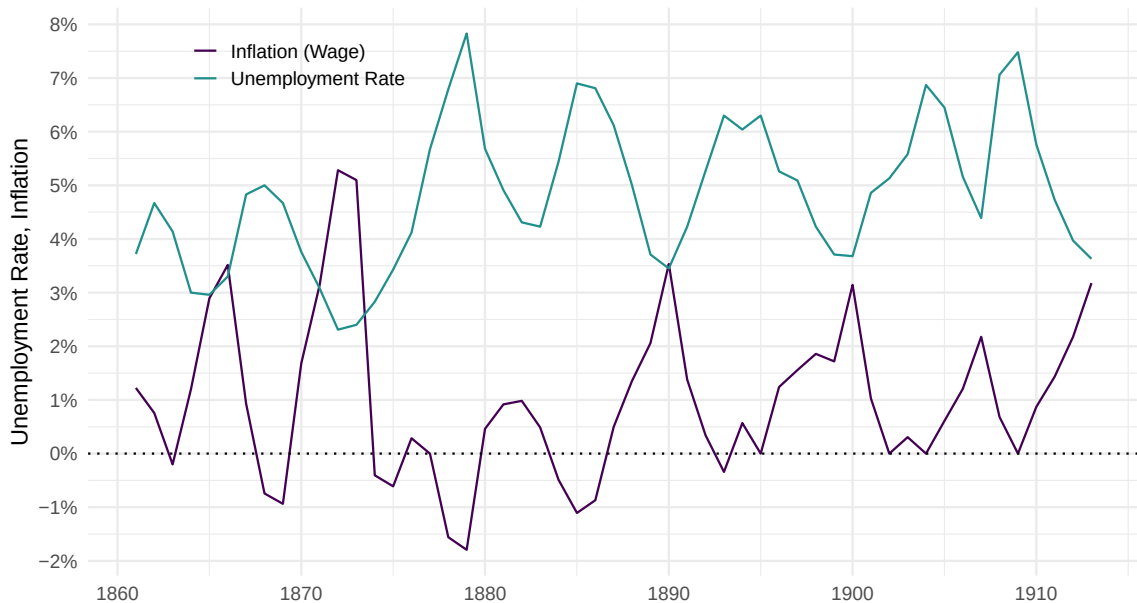


Fig.1.1861 - 1913

Phillips Correlation, 1861-1913



Post 1913 fit was disappointing. Source: Sleeman (2011)

Retrospectives: The Phillips Curve: A Rushed Job?

A. G. Sleeman

JOURNAL OF ECONOMIC PERSPECTIVES
VOL. 25, NO. 1, WINTER 2011
(pp. 223-38)

The Phillips Curve: A Rushed Job? 227

Brown that led to the so-called weekend's work during which Phillips discovered the Phillips curve.⁴

During that weekend in 1956, Phillips probably transcribed, transformed, and plotted the 1861–1913 data and then fitted the curve: a good weekend's work for someone working with a slide-rule and plotting the data by hand. However, I believe that Phillips, dissatisfied with the fit of the curve to the post-1913 data, put his calculations aside in 1956 and returned to his work on control theory. There is no evidence that he discussed his results with his colleagues; for example, Richard (Dick) Lipsey did not learn of the 1958 paper until it was in page proofs. (Phillips may have discussed his work with Meade, but I can find no evidence that he did so.)

Phillips and the Phillips Curve

I believe that Phillips was well aware that his case for the stability of his famous curve was not compelling. His comments on his 1958 paper were often dismissive: he referred to the paper as “a very crude attempt” (Leeson, 2000, p. 218), a “quick and dirty job” (Schwier, 2000, p. 24), something “just done in a weekend” (letter from Gregory¹² quoted by Leeson, 1994a, p. 613), and as a “rushed job” (Blyth, 1978, p. xvi). The then-editor of *Economica*, Basil Yamey (Leeson, 2000, p. 337), wrote that he would show Phillips the Phillips-curve papers submitted to *Economica*, but that Phillips “always declined my invitation to write comments on the more substantial pieces or indeed to write a follow-up article to include his further reflections. He seems to have lost interest in the subject soon after the paper was published. His fertile mind had moved on to other matters.” Holt, a fellow engineer turned economist, who spent a sabbatical at LSE observes (2000, pp. 309–310): “I think that he was a little embarrassed by the attention that the

¹¹ Phillips' data sheets contain a column headed “Unemployment, U.K., lagged 6 mths. M.O.L.” The data run from 1921 to 1944, and then there is a notation “G.B.” beside the 1945 observation that presumably applies to all of the years through 1947. For 1948–1957 there are unemployment figures for the “U.K. lagged 6 months (L.L.O.)” and G.B. unlagged, lagged six months, and lagged seven months.

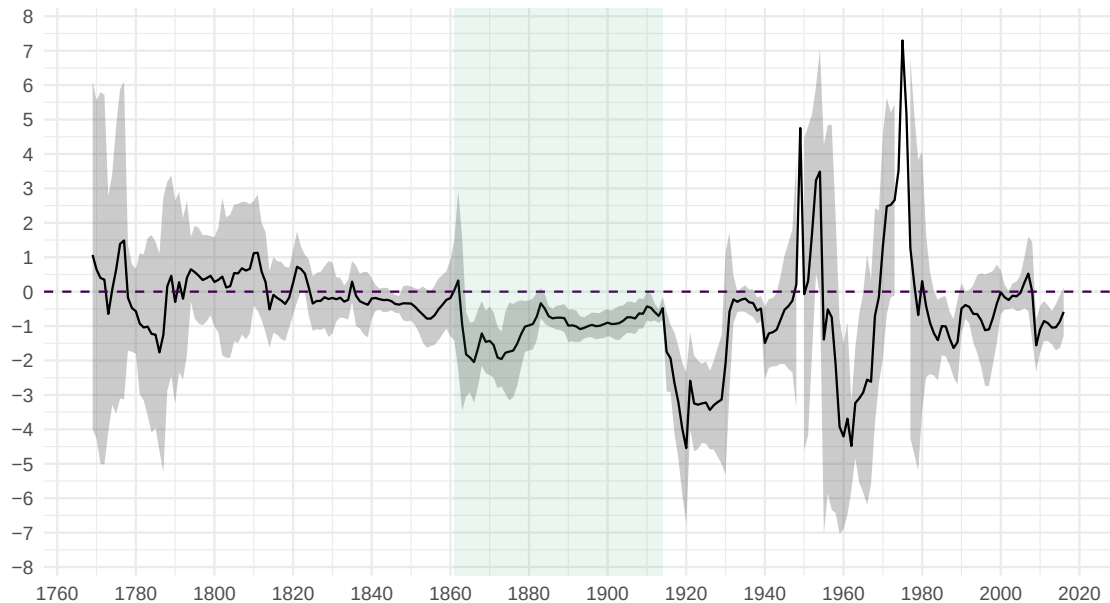
¹² Presumably, Robert Gregory (University of Melbourne).

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paper received . . . perhaps because both the empirical econometric work and the theory were conspicuously sloppy.”¹³

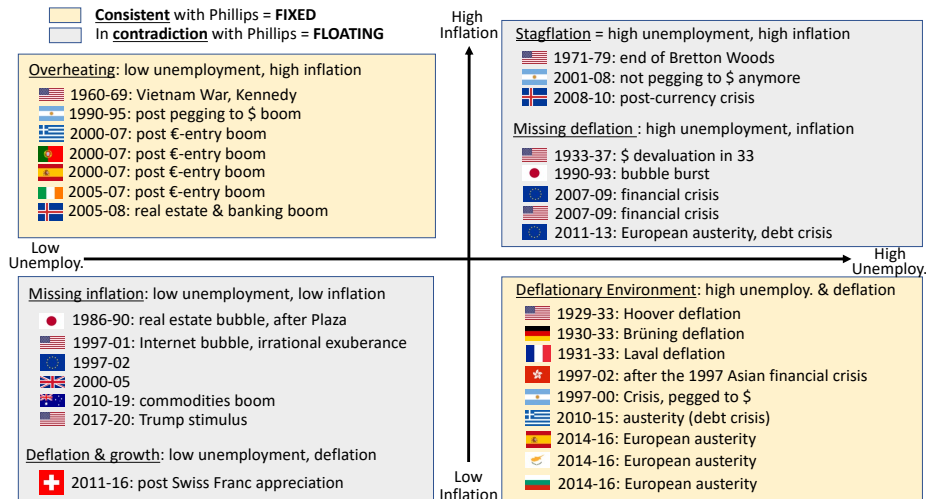
It may seem paradoxical to argue that Phillips was reluctant to publish the paper on which his modern fame rests; but we are blinkered by 20/20 hindsight—that is, we know the paper became a highly cited launching pad for a broad literature, but in 1958 the conclusion was very much in doubt. Leeson's (1998) exhaustive review shows that between 1959 and 1961 the academic literature was “overwhelmingly hostile” to the Phillips curve hypothesis.

Outside of 1861-1913 ?



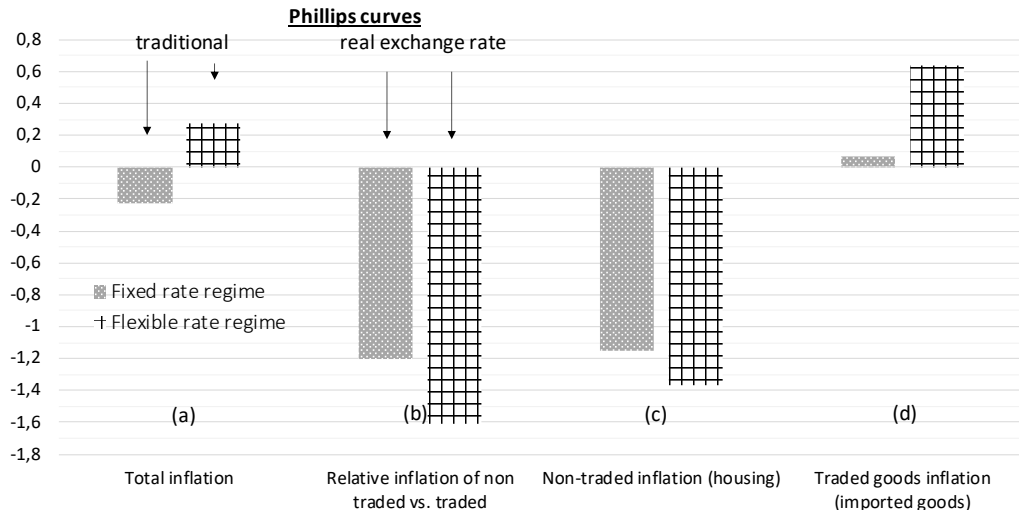
The Dichotomy Holds More Generally

- The original Phillips curve was “discovered” under the gold standard (Phillips) and the Bretton Woods system (Samuelson–Solow), in which an increase in nominal wages is an increase in wages in gold (i.e., real wages).

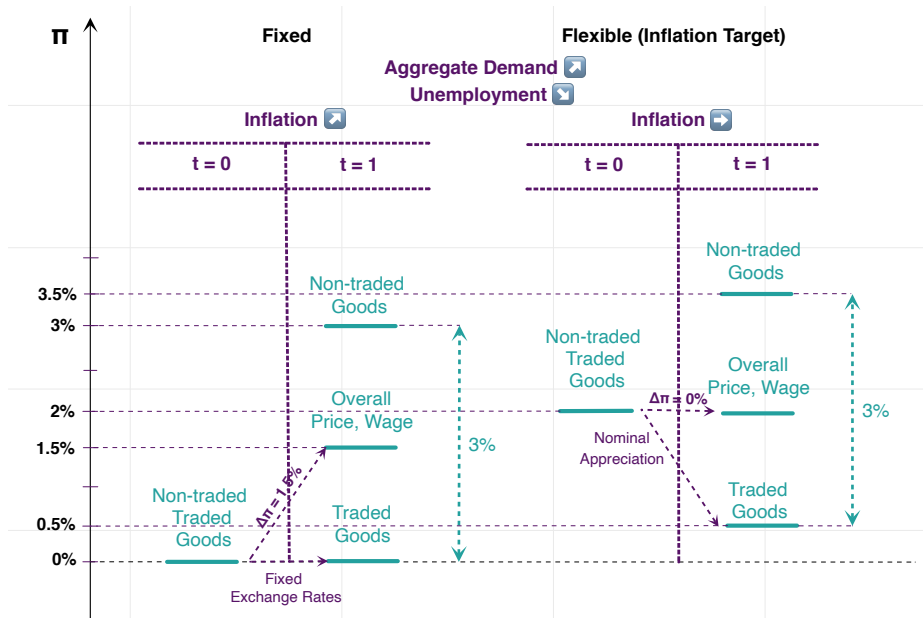


Decomposition Between Non-Tradable Goods (Housing) and Tradable Goods

Estimated coefficient on the unemployment rate in regressions of total inflation, relative inflation of non traded vs. traded goods (real exchange rate), non-traded goods inflation (housing), and traded goods inflation, under fixed and flexible exchange rate regimes



Thesis 2: Decomposition Between Non-Tradable Goods (Housing) and Tradable Goods



Observations

- The original Phillips curve was “discovered” under the gold standard (Phillips) and the Bretton Woods system (Samuelson–Solow), in which an increase in nominal wages is an increase in wages in gold (i.e., real wages).
- More generally, the Phillips curve holds under fixed exchange rate regimes, but to my knowledge: very few examples exist under flexible exchange rates.
- Everywhere the price of housing / rents / non-tradable services rise with aggregate demand up, but also aggregate supply up. All these also drive unemployment down... Correlation can be easily understood...
- I won't talk about **inflation expectations** today, but i also have strong views. Often linked to exchange rates developments...
- Importance of competitiveness issues, trade deficits, and accelerated deindustrialization linked to demand-side policies.

Section 3

Euler equations

Euler equation

$$\begin{cases} \pi_t = \beta E_t[\pi_{t+1}] + \kappa x_t \\ x_t = E_t[x_{t+1}] - \frac{1}{\sigma}(i_t - E_t[\pi_{t+1}] - r_t^n) \\ i_t = \phi_\pi \pi_t + \phi_x x_t \end{cases}$$

- Euler equation (**IS curve**) of the NK model: **real interest rates**. Nominal rates matter **through real rates** in the NK model.
- Even outside of the NK model, we teach that nominal rates should take into account inflation in some way:
 - Realized,
 - Or expected
- Consequence: more realized / expected inflation $\Rightarrow$ raise nominal interest rates to keep real rates unchanged. ECB has justified its actions in keeping real rates unchanged, so the stance of monetary policy.

CHAPTER
2THE NATURAL RATE OF INTEREST: DRIVERS AND
IMPLICATIONS FOR POLICY

The natural rate of interest—the real interest rate that neither stimulates nor contracts the economy—is important for both monetary and fiscal policy; it is a reference level to gauge the stance of monetary policy and a key determinant of the sustainability of public debt. This chapter aims to study the evolution of the natural rate of interest across several large advanced and emerging market economies. To mitigate the uncertainty that typically surrounds estimates of the natural rate, the chapter relies on complementary approaches to analyze its drivers and project its future path. Common trends such as demographic changes and productivity slowdown have been key factors in the synchronized decline of the natural rate. And while international spillovers have been important determinants of the natural rate, offsetting forces have resulted in only a moderate impact on balance.

this was viewed as likely insufficient to tame rapidly rising inflation.² And so it proved to be. Inflation continued to rise, peaking at nearly 15 percent the following year, requiring even higher interest rates and a prolonged recession before the situation was brought under control.

Nearly three decades later as the world faced the global financial crisis of 2008, the Federal Reserve—along with central banks worldwide—slashed interest rates to as close to zero as they thought possible in nominal and real terms. This time around, however, commentators and policymakers raised concerns that interest rates were not low enough to boost demand and inflation. Once again, these concerns proved well-founded, with inflation remaining stubbornly low for much of the next 10 years.

II.A Why inflation has proved persistent

While ongoing research will shed light on why inflation has proved so sticky, several factors are probably at play, and continue to pose upside inflation risks.

First, while the ECB has raised interest rates during the past year by 400 basis points—the most in its history—activity has only slowed modestly. The unemployment rate is at historic lows. Wage growth has been solid and is picking up, though not by enough to begin reversing sharp declines in real wages over the past two years.

The combination of tight labor markets with a still solid stock of household savings and residual pent-up demand may be behind the resilience in activity we have seen so far.

Second, despite the large increase in the nominal policy rate, financial conditions may not be tight enough which impedes monetary policy transmission (slide 8). As seen in the right chart, real rates using market-based measures of inflation expectations are still quite low, and near-term real rates using household measures are likely negative.

Governments

- European Maastricht: Total Deficit $\geq$ -3% of GDP.
- Total Deficit = Interest Payments Deficit + Primary Deficit.
- Higher nominal rates $\Rightarrow$ Higher interest payments (% of GDP). Dividing interest payments by nominal GDP does not help.
- Problem is: inflation tax is not counted as a resource for the government, while it should. Debt / GDP are going down while total deficit / GDP is going up. 2% of GDP.
- Debt = 100% of GDP (we should say 1 year of GDP). Average nominal rate: 1%. 1 % increase nominal rates $\Rightarrow$ average nominal rate: 2% $\Rightarrow$ +1% of GDP interest payments. 3% Maastricht rule: primary deficit goes from -2% of GDP to -1% of GDP.
- Restrictive monetary policy $\Rightarrow$ Restrictive fiscal policy.

Corporations 1/3

- US GAAP and IFRS record liabilities at nominal (historical) value — IFRS 9's amortized cost method keeps debt at face value for its full life, regardless of inflation.
- The real gain inflation generates on liabilities never appears in financial statements: interest expense is computed on the original nominal rate, no implicit gain is booked.
- Financial models split sales into price and volume effects for the income statement — but there's no equivalent mechanism for liabilities. Inflation is forecast for costs and revenues, never “deflated” for debt.
- IAS 29 (hyperinflationary economies) is the exception that proves the rule: it explicitly states debtors “gain purchasing power” from inflation - implicitly admitting the standard system ignores this otherwise.

- Interest coverage ratios (e.g. EBITDA / interest charge) are distorted by inflation because numerator and denominator react asymmetrically to a rate/inflation shock.
- France 2022: inflation 5.2%, but the average cost of new corporate financing rose from 1.18% to 3.54% (+200%). A firm passing costs through (EBITDA +5.2%) that refinances 10% of its debt sees interest charges +12% - its ICR “deteriorates” even though its average real rate turned deeply negative.
- Since ICR is a common loan covenant, this nominal artifact can trigger real consequences: accelerated repayment, restrictions on further borrowing.
- Inflation is well incorporated into P&L and cash-flow forecasts (price vs. volume effects) but almost never into debt - treated as a cost constraint, never as debt relief.

Corporations 3/3 - Tax implications

- Interest deductibility is based on the nominal rate paid, not the real rate: the real rate never enters the tax computation.
- OECD BEPS Action 4 recommends capping deductible net interest at 10–30% of EBITDA (30% most common) — another nominal benchmark.
- Interest charges tend to grow faster than EBITDA during inflation/rate-hike episodes, so firms near the cap risk crossing it: interest above the ceiling loses its tax shield entirely.
- Result: a kink in the marginal fiscal cost of debt — the nominal framework amplifies the fiscal impact of a rate increase even when the real rate is stable

Households

- Suppose your loan is interest only. If interest rates go from 1% to 4%, with inflation going from 2% to 5% then your rate goes from 1% to 4%, and your monthly payments are multiplied by 4.
- In the case of fixed rates, you have a nominal repayment / Income cap usually. (regulatory)

More generally:

- **National Statistical Institutes (NSIs)** don't even correct for inflation when computing capital income, and disposable income...
- In the end, most decisions are based on accounting...
- Which will bring me to my 3rd theme: measurement.

Nominal rates matter...

... independently from real rates !

- Nominal rates matter a lot for governments: through fiscal rules. Nominal rate increases $\Rightarrow$ higher interest charge / GDP $\Rightarrow$ lower primary surpluses.
- Interest expenses matter for corporations: that's how accounting is done. You have limits on nominal interest charge/Net Income or EBITDA. Also limits on how much you can deduct.
- Nominal rates also matter for households through adjustable rate mortgages.
- Nominal rates also matter for households through fixed rate mortgages: borrowing constraints depend on nominal rates, not real rates $\Rightarrow$ Effects of nominal rates, not real on economic activity, notably lending and also construction.
- That's how NSIs compute **household disposable income**, household **saving rates**, etc.

Section 4

Macroeconomics and Measurement

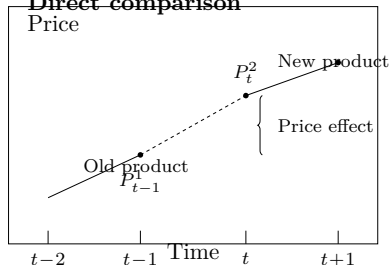
Micro to Macro

- This is exactly what National Statistical Institutes already do to compute GDP ? Rely on firms' accounts and administrative data (wages, etc.)
- They also track price changes to separate quality from quantity — relying on **many, often implicit, assumptions**. Yet it is **very hard to reconstruct** NSIs' national accounts from firm-level, administrative data alone.
- Unfortunately, there is no “open science” here. We don't really know how “the sausage” is made. I argue that this is a problem.
- Quality adjustment / product replacement is **difficult for all statistical agencies**. A problem as old as inflation measurement / national accounting itself. Order of magnitude: Effect of quality adjustments / product replacement according to BLS, in the United States = 2.5% / year. (at the time of Boskin)
- Spirit of inflation measurement: a fixed basket. But product replacement is constant: how do we compare products? = “quality effect” = quality adjustments. Examples: clothing, telecoms, etc. How to treat the appearance of “truly” new products? Floppy disks, cassette tapes (at the time of the Boskin report), new energy-efficient housing.

Main Methods of quality adjustment

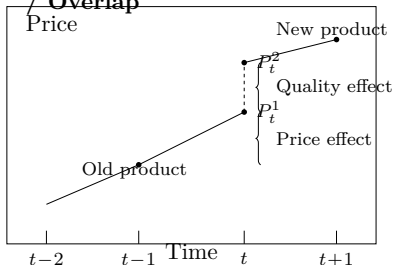
1. Comparable replacement /

Direct comparison



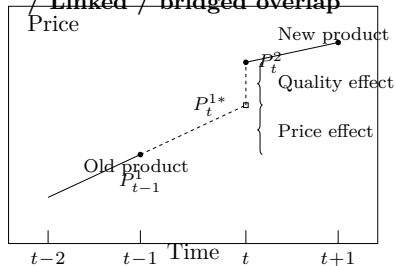
2. Non-comparable replacement

/ Overlap



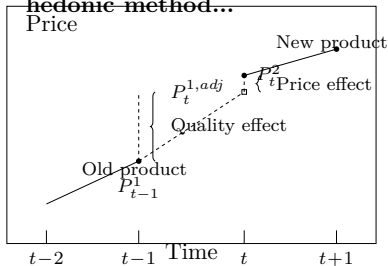
3. Non-comparable replacement

/ Linked / bridged overlap



4. Direct quality adjustment:

hedonic method...



Standardisation ?

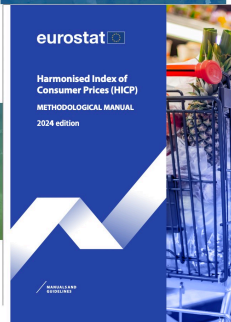
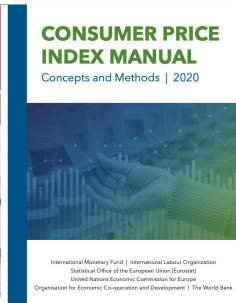
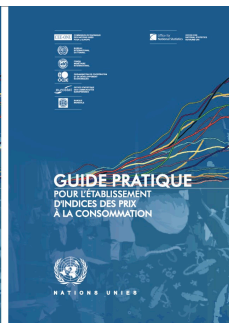
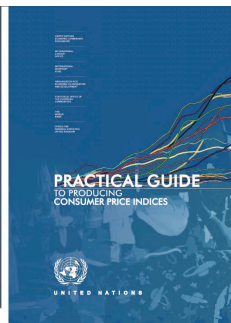
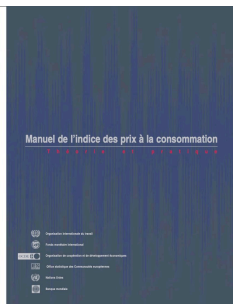
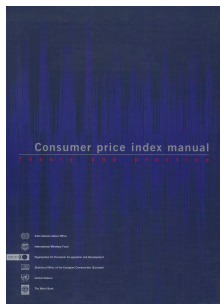
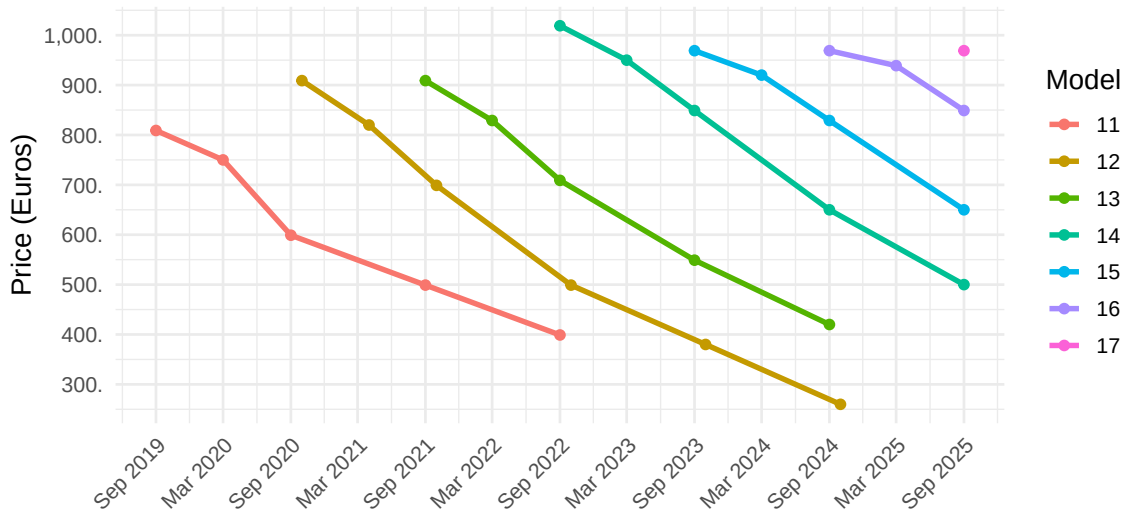


Illustration: iPhone Prices, by Date

Price difference = quality difference or product life cycle?

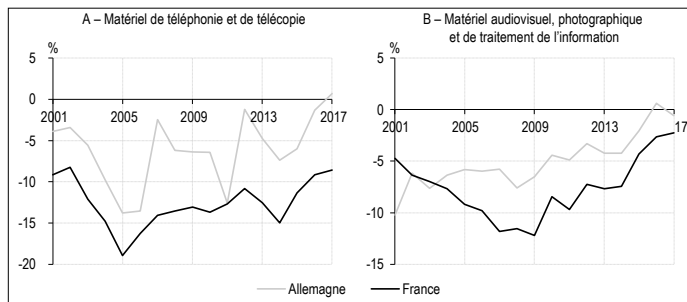
iPhone Prices



Information and Communication

- According to Aeberhardt et al. (2020): for information and communication goods alone, the gap between the **French and German HICP since 2000** is:
 - ▶ **6 percentage points per year** for *telephone and fax equipment* (including mobile phones);
 - ▶ **nearly 3 percentage points per year** for *audio-visual, photographic and information processing equipment* (including computers and tablets).

Figure II – Évolutions en moyenne annuelle de l'indice des prix à la consommation harmonisé en France et en Allemagne (%)



Source et champ : Eurostat, IPCH base 2015 ; IPCH pour les postes 8.2 et 9.1 de la Coicop.

Matching and the Overlap Method for Markets with Rapid Turnover of Models

6.186 The first approach to address markets with rapid turnover of models is simply a more extensive use of the overlap approach outlined previously for permanently missing prices. In this case, it is adopted for permanently missing varieties that occur frequently, as is usual for changes in models of **electronic goods** and **automobiles**. Matching prices of a few representative varieties becomes a less feasible approach in this context. A backward imputation is illustrated in Table 6.11 though, as outlined in the illustration for Table 6.5C, a forward imputation can be equally justified and both methods provide the same results when the imputations are based on the price changes of overlapping matched samples.

Table 6.11 Illustration of Rapid Model Turnover

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.
1	25	25	25	25	25	25	25	25	25	25	20		
1R											29.2	30	30
2	35	35	35	35	35	32							
2R						37	37	37	37	37	37	40	40
3	30	30	30	30	30	30	30	30	30	30	27		
3R											32.2	33	33
4	29	29	29	29	29	28							
4R						30	30	30	30	30	30	30	30
5	29	29	29	29	29	29	29	29	29	29	29	29	29

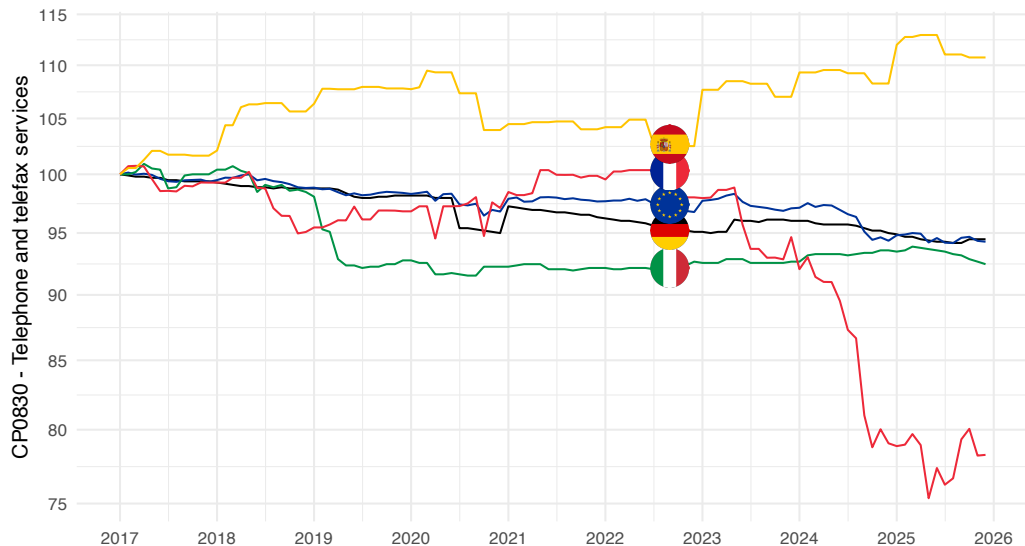
Values in bold are imputed.

6.193 The **overlap method** may be subject to bias if applied to where there is substantial churn in the product market and an active policy by the supplier of introducing upgraded replacement models. The nature and extent of the bias depends on the pricing strategy. Table 6.11 illustrates a policy of lower pricing at the end of the life cycle and a higher price at the start. Importantly, the example has no price change for other matched models, from which the imputation was drawn, and thus a biased imputation at this critical overlap period. **The bias is substantial and downward.** Alternative pricing strategies are given in Annex 6.3 along with their implication for bias from using the overlap matching. **It has been demonstrated in empirical studies that the method can introduce substantial bias under quite reasonable conditions.** The nature and extent of the bias depend on **business pricing strategies** that may change over time and are unpredictable, which is a concern for CPI compilation in this important product area. The **overlap method** is thus

not recommended for product markets with a high rate of model churn.

Telecommunications Services

Profile method, lowest price tracked in France:



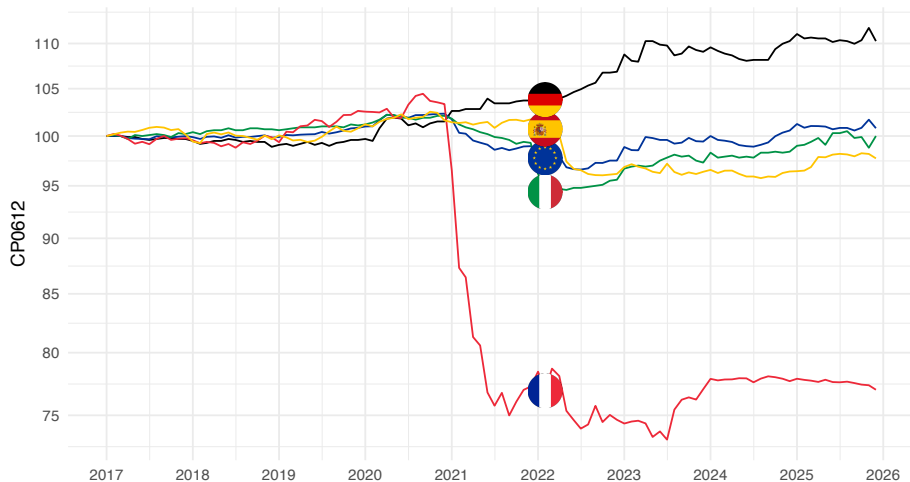
- Quality adjustment for medicines is particularly difficult in general.
- It is even more so in the French context, because health insurance regulates prices, and product renewal provides manufacturers an opportunity to increase prices. The quality effect therefore contains an element of “hidden inflation”:

$$\Delta \text{Medicine price} = \text{quality effect} + \text{'hidden inflation' effect.}$$

- The quality effect estimated by the implicit method (overlap or bridge overlap) is then biased by construction.
- This problem is more significant in France, because the French CPI **includes health expenditure reimbursed by social security**, in contradiction with international recommendations on price indices.

Surgical Masks During Covid-19

- When do you introduce products and do you ?
- Surgical masks were added to the basket when they were in short supply, then prices fell sharply... Effect on the comparability of COICOP index 0612, other medical products:



Rents

- Under French law, improvement works constitute a **legal lever** allowing a **repositioning of rent to market rate upon re-letting**.
- The effective increase often exceeds the value attributable to the works.
- This is true when the tenant remains in place, but especially at the time of re-letting. The observed increase is then mixed:

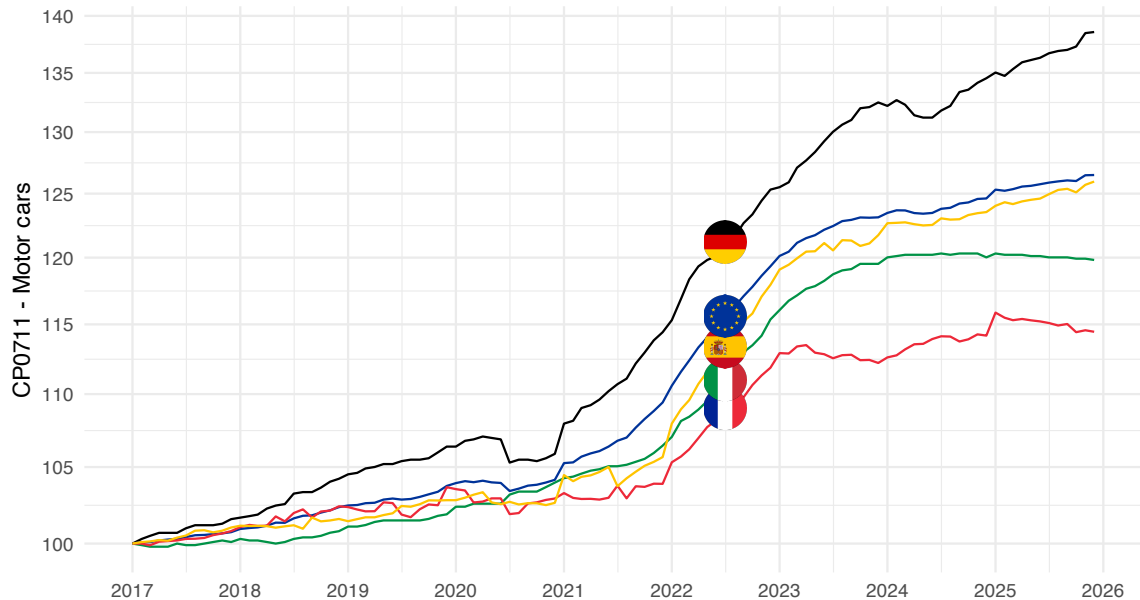
$$\Delta \text{rent} = \text{quality effect} + \text{market repricing effect}.$$

- The method used treats the entire increase as though it were solely a quality effect, thereby neutralising all of the rent increase. Using rent increases without works (with or without re-letting) as a reference leads to a **systematic bias**...
- This is the statistical justification for the Eurostat recommendation: do not use imputation / bridged overlap when rents are regulated...

Greener Products

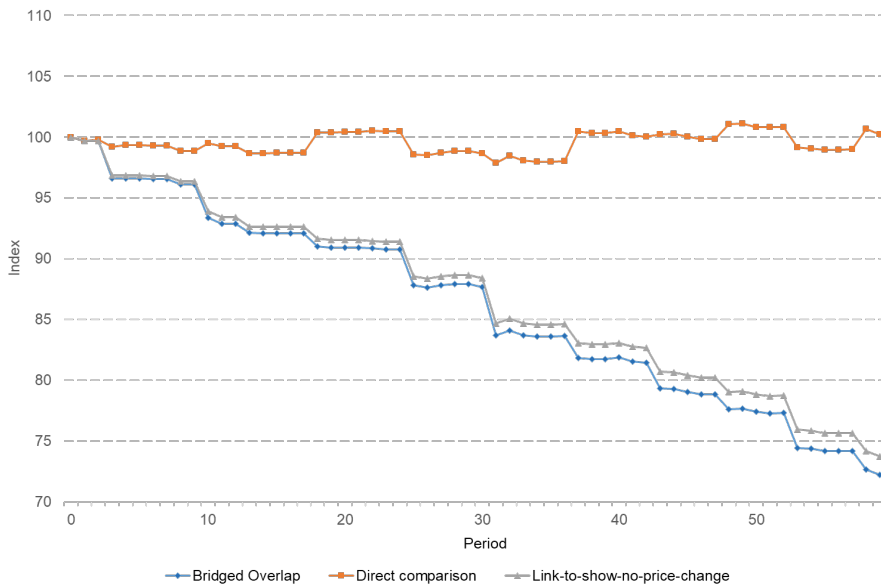
- Issue addressed in the thematic report on “Inflation” from the Pisani-Mahfouz report, published in 2023.
- The overlap method equates more expensive purchases linked to the ecological transition (electric vehicles, renovated housing) with products of **higher quality**, whose price is therefore deemed to have fallen.
- This approach can be misleading: these expenditures are often **constrained by regulation** and may **reduce purchasing power**...
- The same applies to the construction cost index: energy performance is not inflation, it is quality improvement.
- Do **energy renovations** generate **sufficient savings** to offset their initial cost, as this quality adjustment method assumes?

Cars

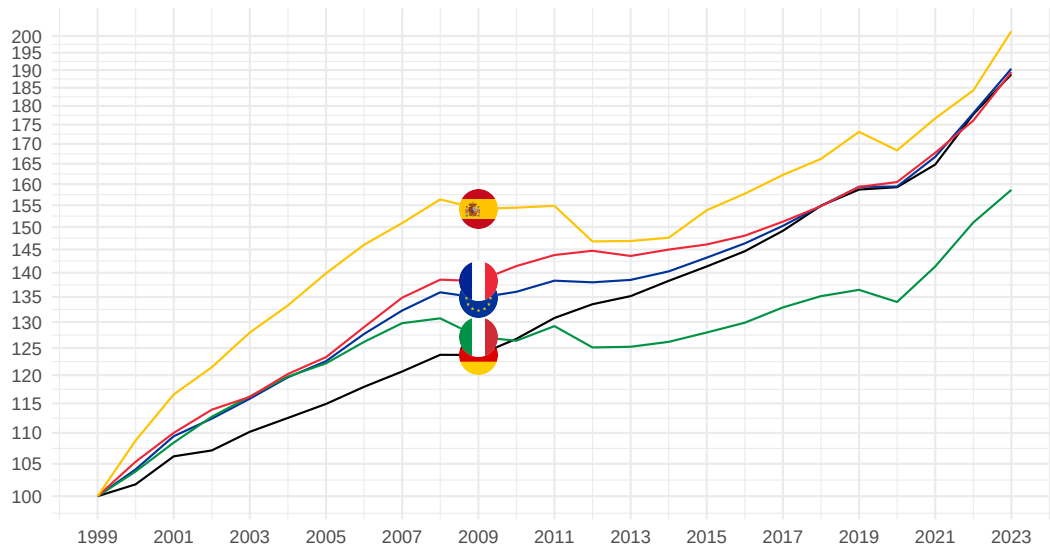


Food: Example of Beer

Figure 1: Impact of bridged overlap (ECB)

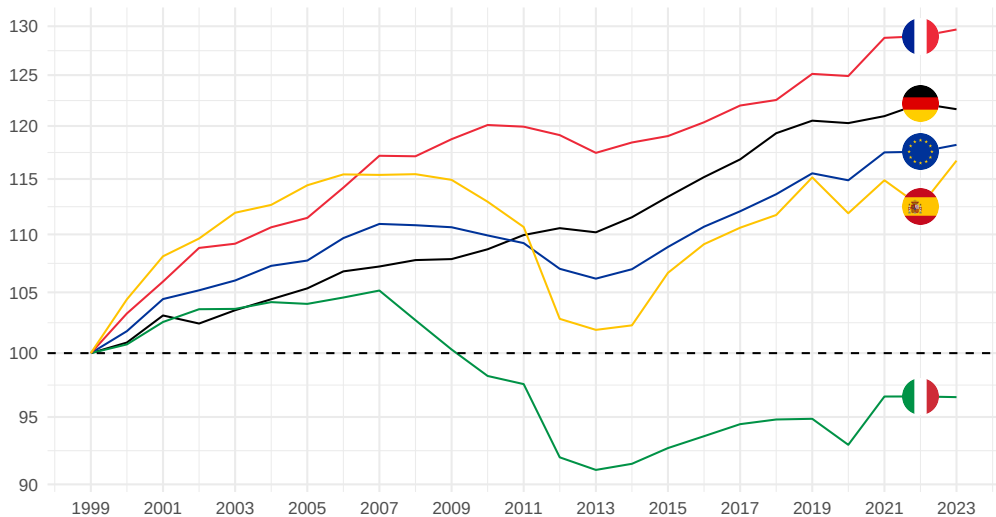


Nominal Income Growth...



Source: Eurostat, calculs de l'auteur

Real Nominal Income Growth



Source: Eurostat, calculs de l'auteur

Don't use hedonic methods

Countries NOT using Hedonic Methods (Bridged Overlap / Direct Comparison only)				
Country	Code	Main Methods	Scanner?	Notes
France	FR	Field collection; direct comparison and bridged overlap. Scanner data: 'recovery in month m-2' — the product replacing i	✓	Option pricing model adopted for new motor vehicles. Scanner data
Ireland	IE	Bridged overlap main method. Direct comparison for equivalent products. No hedonic methods currently.		Ireland does not use hedonic methods.
Greece	EL	Bridged overlap main method. Direct comparison for equivalent products. No hedonic methods.	✓	Greece does not use hedonic methods. Limited scanner data
Portugal	PT	Bridged overlap main method. Direct comparison for equivalent products. No hedonic methods.	✓	Portugal has been expanding scanner data use.
Romania	RO	Bridged overlap main method. Direct comparison for equivalent products. No hedonic methods.		
Bulgaria	BG	Bridged overlap main method. Direct comparison for equivalent products. No hedonic methods.		
Croatia	HR	Bridged overlap main method. Direct comparison for equivalent products. No hedonic methods.		
Slovakia	SK	Bridged overlap main method. Direct comparison for equivalent products. No hedonic methods.		
Slovenia	SI	Bridged overlap main method. Direct comparison for equivalent products. No hedonic methods.		
Estonia	EE	Bridged overlap main method. Direct comparison for equivalent products. No hedonic methods.		Estonia uses web scraping for some categories.
Latvia	LV	Bridged overlap main method. Direct comparison for equivalent products. No hedonic methods.		
Lithuania	LT	Bridged overlap main method. Direct comparison for equivalent products. No hedonic methods.		
Luxembourg	LU	Bridged overlap main method. Direct comparison for equivalent products. No hedonic methods.		Luxembourg is a small country with centralized price
Cyprus	CY	Bridged overlap main method. Direct comparison for equivalent products. No hedonic methods.		
Malta	MT	Bridged overlap main method. Direct comparison for equivalent products. No hedonic methods.		Malta is a small island economy.
Iceland	IS	Bridged overlap main method. Direct comparison for equivalent products. No hedonic methods.		

BLS: Many Explicit Methods...

ELI	Entry Level Item (ELI) Title	Quality Adjustment Method
HA011	Rent of primary residence	Age bias, structural change, Facility adjustments for parking and A/C units, Analyst adjustments (For more information, see A review of recent improvements to the CPI's housing age-bias adjustment , Updating the Housing Age-Bias Regression Model in the CPI , Updating the rent sample for the CPI housing survey , and the factsheet)
HC011	Owners' equivalent rent of primary residence	Age bias, structural change, Removal of the cost of landlord-provided utilities (cost of utilities) for the calculation of pure rents, Facility adjustments for parking and A/C units, Analyst adjustments (For more information, see A review of recent improvements to the CPI's housing age-bias adjustment , Updating the Housing Age-Bias Regression Model in the CPI , Updating the rent sample for the CPI housing survey , and the factsheet)
EE011	Personal computers and peripheral equipment	Cost based adjustments (Measuring Price Change in the CPI: Computers, peripherals, and smart home assistant devices)
TA011	New car and truck purchase	Cost based adjustments (Quality Adjustment in the CPI: New, Used, and Leased Motor Vehicles)
TA021	Used cars and trucks	Cost based adjustments (Quality Adjustment in the CPI: New, Used, and Leased Motor Vehicles)
TA031	Vehicle leasing	Cost based adjustments (Quality Adjustment in the CPI: New, Used, and Leased Motor Vehicles)
AA012	Men's sport coats and tailored jackets	Hedonic adjustments
AA013	Men's outerwear	Hedonic adjustments
AA033	Men's shirts, sweaters, and vests	Hedonic adjustments
AA041	Men's pants and shorts	Hedonic adjustments

ELI	Entry Level Item (ELI) Title	Quality Adjustment Method
AB011	Boys' outerwear	Hedonic adjustments
AB014	Boys' suits, sport coats, and pants	Hedonic adjustments
AC032	Women's skirts, pants, and shorts	Hedonic adjustments
AC033	Women's suits and suit coordinates	Hedonic adjustments
AD011	Girls' outerwear	Hedonic adjustments
AD012	Girls' dresses	Hedonic adjustments
AD014	Girls' skirts, pants, and shorts	Hedonic adjustments
AE021	Boys' footwear	Hedonic adjustments
AE022	Girls' footwear	Hedonic adjustments
ED041	Land-line telephone services	Hedonic adjustments
EE031	Internet access and other information services	Hedonic adjustments
EE041	Phones, accessories, and smartwatches	Hedonic adjustments
RA011	Televisions	Hedonic adjustments
RA021	Cable and satellite television service	Hedonic adjustments
RA031	Other video equipment	Hedonic adjustments
RD012	Photographic equipment	Hedonic adjustments
AB012	Boys' shirts and sweaters	Hedonic adjustments (QA model factsheet: Boys' shirts and sweaters)
AE011	Men's footwear	Hedonic adjustments (QA model factsheet: Men's footwear and QA model factsheet: Athletic footwear)
AA011	Men's suits	Hedonic adjustments (QA model factsheet: Men's suits)

ELI	Entry Level Item (ELI) Title	Quality Adjustment Method
AA021	Men's underwear, hosiery, nightwear, and swimwear	Hedonic adjustments (QA model factsheet: Men's underwear)
HK014	Microwave ovens	Hedonic adjustments (QA model factsheet: Microwaves)
HK013	Ranges and cooktops	Hedonic adjustments (QA model factsheet: Ranges and cooktops)
HK011	Refrigerators and freezers	Hedonic adjustments (QA model factsheet: Refrigerators)
AG011	Watches	Hedonic adjustments (QA model factsheet: Watches)
AC041	Women's undergarments, nightwear, shapewear, and swimwear	Hedonic adjustments (QA model factsheet: Women's bras)
AC011	Women's outerwear	Hedonic adjustments (QA model factsheet: Women's Outerwear)
HK012	Washers and dryers	Hedonic adjustments (QA model factsheet: Clothes washers) (QA model factsheet: Clothes dryers)
AD013	Girls' tops	Hedonic adjustments (QA model factsheet: Girls' tops)
AE031	Women's footwear	Hedonic adjustments (QA model factsheet: Women's footwear and QA model factsheet: Athletic footwear)
AC031	Women's tops	Hedonic adjustments (QA model factsheet: Women's tops)
AC021	Women's dresses	Hedonic adjustments (QA model factsheet: Women's Dresses)
ED031	Wireless phone service	Hedonic imputation (Measuring Price Change in the CPI: Wireless telephone service)

What About Boskin et al.?

- Boskin: inflation would be **over-estimated**.
- A **primarily political** agenda, according to Greg Mankiw himself. Only factors leading to overestimation were examined.
- But above all: are the identified biases true everywhere in the world, or only in the US? (basket update far less frequent than in France)

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Several participants pursued the question, raised by both discussants, of what the CPI is for. Mankiw elaborated on the idea, discussed by Griliches, of indexing social security benefits to the median wage. He argued that, from the perspective of social risk sharing, it is highly unlikely that the CPI is the optimal index for retirement benefits. Indexes like the median wage, or nominal income per person, would lead to greater intergenerational risk sharing, while avoiding measurement issues like quality adjustments. Mankiw expressed the view that the current debate about the CPI was really a political debate about how, and by how much, to cut real entitlements.

Absolute is much harder !

Not taken into account:

- **Free goods** (Google, Facebook, Wikipedia): zero price but real value
- **Gig economy**: new service categories, pricing mechanisms
- **Dynamic pricing**: even harder issues that National Statistical Institutes treat in different ways...
- **Online platforms**: price dispersion collapses; outlet substitution accelerates.
- **Taste for variety** and Schumpeterian growth. (Aghion et al.)

Lower bar: get comparability of price indices, before we can talk about whether people are objectively better off today than yesterday ?

Section 5

Conclusion

Taking stock

- Are Phillips curves even the right tool? What pins down the price **level**? Relatively to others, largely the nominal exchange rate. The *world* price level is a much harder question.
- Inflation measurement: cross-country methodology differences run $\sim 0.5\%$ /year — the same order of magnitude as most GDP growth or productivity differentials. Maybe we should worry more about how the numbers are built, and less about taking NSI output at face value.
- Should Euler equations run on nominal rates rather than real rates?
- The Taylor principle - raise nominal rates more than one-for-one with inflation - only holds if nominal rates don't matter in themselves. If they do, shouldn't central banks be more cautious?
- Are prices actually sticky? Monetary non-neutrality may not require sticky prices at all.

Conclusion

Many other issues I didn't touch on today:

- Does risk even matter? CAPM fails badly (Welch). The one robust fact: equities have outperformed bonds and cash on average - is that risk, or something else? (“Triumph of the Optimists.”)
- What if higher savings raise asset prices (via bubbles) rather than investment, feeding *higher* returns but *less* capital formation, not more? (higher required return on capital)

Concluding thoughts:

- More broadly: given how badly the models fail, even qualitatively, should we lean more on qualitative reasoning?
- Given how little we actually know, can we do “normal” science yet?

Thank you !