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Inflation Indexation in Public Finances

A Global Dataset on Current Practices

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Inflation Indexation in Public Finances: A Global Dataset on Current Practices*

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ABSTRACT: This paper presents a new global dataset on current practices for four budget items in terms of indexation to the price level and other nominal variables. Compiling data from documents of select multilateral organizations, governments, and related literature as well as conducting a survey among IMF country desks of 190 country-members, we show how indexation is internationally applied in (i) personal income tax brackets; (ii) pensions; (iii) social assistance programs; and (iv) public wages. The dataset shows that while indexation policies vary significantly across economies, some trends can be identified. For example, indexation is more common on pension and social grants than on taxes, and falls with the degree of economic development. We further discuss some applications of this new dataset. Those include an accounting exercise illustrating the impacts of indexation on fiscal outcomes during episodes of inflation surprises; and an analysis of the association between the overall degree of indexation combining the four budget items and inflation persistence.

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Contents

Glossary

ADB	Asian Development Bank
AE	Advanced Economies
AFR	Economies belonging to the African Department at the IMF
APD	Economies belonging to the Asia and Pacific Department at the IMF
ECB	European Central Bank
EM	Emerging Markets
EUR	Economies belonging to the European Department at the IMF
FCS	Fragile and Conflicted States
GDP	Gross Domestic Product
IBP	International Budget Partnership
IMF	International Monetary Fund
ISSA	International Social Security Association
LIDC	Low-Income and Developing Countries
MCD	Economies belonging to the Middle East and Central Asia Department at the IMF
OBI	Open Budget Index
OECD	Organisation for Economic Cooperation and Development
MISSOC	Mutual Information System on Social Protection
RRC	Resource Rich Countries
SDS	Small and Developing States
SSA	Social Security Administration
WB	World Bank
WHD	Economies belonging to the Western Hemisphere Department at the IMF

I.   Introduction

Indexation of payments and renumerations—usually to the price level or to private (minimum) wages—is a key issue for public finances. In an attempt to lessen the impact faced by different agents in the face of high and volatile prices, it has been historically adopted by many public administrations (for example, for the adjustment of taxes brackets and budget items), so that their nominal values remain in tandem with inflation or with changes in wages.

However, the use of indexation itself, and the degree in which it is used, involve important trade-offs. On one hand, indexing public wages, pensions, or welfare transfers reduces uncertainty, improves transparency, and preserves the purchasing power of civil servants, retirees, and low-income households. It may also prevent distortionary gaps between public and private wages, or a possible brain drain from the public sector. On the other hand, indexation sustains real expenditures that contribute to aggregate demand and may affect (backward-looking) inflation expectations, potentially making inflation more persistent. If public wages are a benchmark for private wages (as in many economies), indexation of public wages could prolong wage and inflationary pressures (Abdallah, Coady, and Jirasavetakul, 2023; and IMF, 2023a). Widespread indexation can further limit the scope for discretionary cuts. Hence, measuring the current level of indexation in each economy is key to understand how the current global inflationary episode will impact and be impacted by that practice.

This paper performs a survey and presents a new dataset on current international practices in terms of indexation to the price level and other nominal variables for four budget items: (i) personal income tax brackets; (ii) pensions; (iii) social assistance programs; and (iv) public wages. To the best of our knowledge, our dataset is the only existent information about the current status of indexation of budget items with a global scope and covering both a revenue and three expenditure items.[1] Such a comprehensive and balanced sample could assist cross-country analyses that demand information on indexation practices.

The preparation of the data followed two steps. First, we reviewed the academic literature and select official international[2] and governmental documents, including Social Protection Systems Reviews reporting on the status of indexation for the four fiscal variables of our focus. Second, we performed two surveys among IMF country desks of its 190 country-members in the months of February and November 2023 to corroborate some of the initial findings and expand the coverage of our analysis, receiving information from 175 of them.

Most of the academic literature on indexation originated during the Great Inflation period between 1965 and 1982 (Bordo and Orphanides, 2013). Indeed, indexation became particularly prevalent in the 1970s with the literature primarily focusing on wage indexation and its macro-economic implications through theoretical modelling (see, for example, Barro, 1976; Gray, 1976; Fisher, 1977; and Blanchard, 1979). Empirical work during this period was limited, even though it highlighted the limited impacts of indexation (Fischer, 1986; and Holland, 1995). Since then, studies on indexation continued with analyses performed, for example, by Stock and Watson (2003), Bernanke (2004), Giannone, Reichlin, Lenza (2008), and Ascari and Sbordone (2014) and references therein. But during this period of the so-called Great Moderation, indexation of wages declined along with the inflation rate, whereas indexation of pensions remained widespread (Bank of International Settlements, 2022).[3] In fact, Hofmann, Peersman, and Straub (2012) find that the decline of wage indexation between the "Great Inflation" and the "Great Moderation" in the US implies a reduction in the long-run impact of

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[1] Earlier surveys of indexation practices focus on a smaller set of countries (mainly OECD countries) and/or fewer budget items.

[2] Some of the international financial institutions surveyed were the Asian Development Bank (ADB), the European Central Bank (ECB), the International Monetary Fund (IMF), the International Social Security Association (ISSA), the Mutual Information System on Social Protection (MISSOC), the Organisation for Economic Co-operation and Development (OECD), and the World Bank (WB).

[3] Pension indexation has spread from only half-a-dozen OECD countries in the 1960s to virtually the whole of the OECD since several decades (Whitehouse, 2009).

supply and demand shocks on prices of 44 percent and 39 percent, respectively. Regarding the literature on social security and tax indexation, it tended to focus on specific country examples and on its distributional and budgetary implications (OECD, 2022c; Pomerleau, 2018; Sutherland and others, 2008; and Whitehouse 2009).

The recent surge in global inflation has rekindled the academic interest in indexation practices. Examples include Carrillo, Peersman, and Wauters (2022), who attempted to explain the changes in wage indexation over time building on a standard New Keynesian DSGE model. Gautier, Roux, and Castillo (2022) studied the impact of wage setting institutions on wage rigidity using evidence from French micro data. Beer, Griffiths, and Klemm (2023) explored the non-neutralities of tax policy during periods of inflation, partly driven by the lack of automatic indexation of tax thresholds and brackets. Galeano and others (2023) explored the role of social security indexation in driving procyclicality of automatic government spending in developing economies. Guerrieri and others (2023) further introduced a micro-founded type of indexation, capturing the level of price stickiness in each sector to analyze relative price responses to an oil shock in a sector-level, closed economy, set-up.

Our main contribution to this literature is two-fold. First, we create a new global dataset on current international indexation practices and present descriptive statistics of the data as well as perform correlation analyses to check if some relevant variables (e.g., budget transparency) are correlated with indexation to the price level. Both the data and descriptive statistics may be of interest for researchers trying to understand the impact of inflation on public finances and how those can spill back into the economy. Second, we illustrate two applications of this dataset: i) we perform an accounting exercise comparing the baseline budgets for the 2022 fiscal year with their outturns in 12 select economies, quantifying the contribution of inflation surprises to the realized fiscal primary balance through their indexation practices;[4] and ii) we quantify the combined degree of indexation of the three spending items for each economy in our sample, examining its correlation with inflation persistence.

As main findings, our data show that indexation policies vary significantly across economies and economic regions: advanced economies (AEs), emerging markets (EMs), and low income and developing countries (LIDCS). Yet, some trends are still identified. First, indexation, including to prices, is currently more common on politically salient expenditure items, such as pension and social grants, than on taxes. Second, the degree of indexation falls with the level of economic development. In line with its prominence in AEs, our correlation analyses show that indexation is associated with more effective and transparent governments. Resource-rich economies appears to rely less in indexation than other economies. Moreover, our accounting exercise suggests that indexation can have significant impacts on fiscal outcomes during episodes of inflation surprises. Importantly, we also find evidence of a positive correlation between the share of spending indexed to inflation and inflation persistency in our sample.

The rest of the paper is organized as follows. Section II describes the details of the data collection process, followed by the presentation of the survey results in Section III. Section IV performs the accounting exercise to estimate the impact of indexation practices during the surprise inflation of 2022 for a sample of 12 economies. Section V presents an analysis of the relationship between indexation and inflation persistence. Section VI concludes the paper with our key takeaways and discusses some applications for which this new dataset could be useful for researchers.

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[4] The economies for which the accounting exercise was performed are Belgium, Brazil, France, Germany, Italy, Mexico, South Africa, Tanzania, Türkiye, United Kingdom, and United States.

II.   Data Compilation Process

This section presents the details on the data collection process of indexation practices across the world. It discusses initially the review of literature and select official multilateral and governmental documents, reporting the status of indexation for the four fiscal variables of our focus. It then describes the survey, including the questions, performed among IMF desks of 192 economies[5] in the months of February and November 2023.

A. Review of the Literature and Official Documents on the Status of Indexation

The list below indicates the literature and documents reviewed to gather information on status of indexation in different economies and budget items:

▪ *Pension indexation* – The database contains a sample of 175 economies on current pension indexation practices in state pensions systems. The multiple sources used included OECD (2021) and ECB (2022). For most LIDCs and EMs, the data were collected from the most recently available (2018/19) reports "Social Security Programs Throughout the World" published by the United States Social Security Administration (SSA 2002a, 2002b, 2003a, 2003b, 2018a, 2018b, 2019a, 2019b) in collaboration with the International Social Security Association (ISSA, 2022). The "benefits adjustments" of old-age benefits were first analyzed to identify if the adjustments are regular and not dependent on financial resources of the system—in which case, they are considered as indexed and then, as a second step, categorized by the type of indexation—i.e., whether they are indexed to prices, wages, or mixed/other factors such as GDP growth. In the case where "benefits adjustments" do not indicate regular adjustments, they were then classified as "*no indexation.*"

While our main dataset is cross-sectional and focuses on the current indexation practices, we briefly explore the trends across time for pension indexation. Specifically, the "Social Security Programs Throughout the World" reports are produced every two years going back to 2002/03. Leveraging the availability of this time-series, we compiled data on pension indexation for the years 2002/03 and for the latest available year 2018/19 for a sample of 118 economies to explore how pension indexation has evolved over the last two decades. The data for the most recent vintage (2018/19) was then updated with current indexation practices using our internal survey with IMF desks in February and November 2023 (see II.B).

▪ *Social assistance programs indexation* – The database contains a sample of 133 economies on current social assistance program indexation practices. The multiple sources compiled include the detailed database of 31 economies from Mutual Information System on Social Protection (MISSOC, 2022) and OECD (2023). Special focus was given to the "benefits adjustments" of family allowances and guaranteed minimum income. For the rest, the data were collected from the 2018/19 "Social Security Programs Throughout the World" published by the United States Social Security Administration (SSA, 2002a, 2002b, 2003a, 2003b, 2018a, 2018b, 2019a, 2019b) in collaboration with the International Social Security Association (ISSA), based on country responses to those publications. Here, special importance was given to analyze the "benefits adjustments" of social assistance grants and family allowances. If an economy was identified to have regular adjustments, the economy is coded as indexed. The type of indexation—i.e., to prices or other variables such as expenditure surveys of low-income households—was further identified. In the case that "benefits adjustments" do not indicate regular adjustments, the economy is then classified as having "*no indexation*". The dataset was then verified and updated using an IMF desk survey in February and November 2023 as discussed below.

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[5] The dataset includes Hong Kong SAR, Macao SAR, and West Bank Gaza.

▪ *Personal income tax threshold indexation* – The sample has 173 economies and classifies economies based on whether the prevailing personal income tax bracket adjustments are automatically tied to inflation, regularly adjusted but with an unclear process (de facto), or not adjusted regularly. The cross-country analysis was done using the results from Beer, Griffiths, and Klemm (2023), who compiled the tax indexation practices analyzing the International Bureau of Fiscal Documentation (IBFD) country tax profiles published in 2022 (IBFD, 2022). The compilation was further verified using OECD (2023). The database was then updated with the survey among IMF country desks in February and November 2023.

▪ *Public sector wages indexation* – The sample has 121 economies. The primary source was a previous survey conducted among IMF country desks in 2016 (IMF, 2016) on pay setting systems including indexation practices which contains 77 economies. We updated and expanded the dataset using multiple sources, including IMF (2018)—by using its results of the survey question: "*Are base wages indexed?*". We further used ECB (2022)'s individual country reports, updating and expanding those data by our survey among IMF country desks from February and November 2023.

B. Survey of Indexation Practices among IMF Country Desks

After compiling initial database of indexation practices for the four budget items based on the review of literature and official documents, we submitted for review by the IMF country desks of the 192 member economies of the IMF. The survey was sent in an internal email to all economists working as country desks on January 20, 2023. The deadline for responses was February 22, 2023. A final internal review completed in November 2023 resulted in some updates, partly reflecting recent policy changes.[6]

As presented in the database annexed to this paper (Annex I), the survey already presented the categories for each budget item with the different possibilities of indexation. So, each country desk only needed to double-check if the information provided was correct and complement the dataset if the information was missing. As in Annex I, the distinct categories for each of the budget item were:

▪ Pension indexation: (i) *no automatic indexation*; (ii) *automatic indexation to prices*; (iii) *automatic indexation to wages*; and (iv) *automatic mixed (m) indexation to a combination of prices (p), wages (w) etc.*[7]

▪ Social assistance programs indexation: (i) *no automatic indexation*; (ii) *automatic indexation to prices*; and (iii) *automatic indexation to other variables*.

▪ Personal income tax (PIT) threshold indexation: (i) *ad-hoc adjustment*; (ii) *automatic threshold adjustment by law*; and (iii) *de facto regular threshold adjustment but with no law*.

▪ Public sector wages indexation: (i) *no automatic indexation*; (ii) *automatic indexation to prices*; and (iii) *automatic indexation to other variables*.

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[6] This paper does not reflect any revisions in indexation rules since November 2023.

[7] This includes all forms of mixed indexation: (i) countries that use a weighted index of prices and wages for their pensions (e.g., Czech Republic (50 percent *p* plus 50 percent *w*), and Slovenia (40 percent *p* plus 60 percent *w*); (ii) countries that have a mix of factors, including sustainability factors and automatic adjustment mechanisms (AAMs)—e.g., Germany with *w* sustainability factor; the UK, with its triple lock (i.e., maximum{*p,w,*2.5 percent}; Sweden and Finland with *w* plus AAMs; and Luxembourg that has automatic price indexation (whenever the six-month moving average of the National Index of Consumer Prices (NICP) has increased by 2.5 percent since the preceding wage indexation) as well as adjustment with respect to the evolution of real wages every two years; and (iii) countries that use a mix of indexation practices by age or program (e.g., Georgia with indexation to prices until age 70 and to *p* plus real GDP growth rate from age 70 years-old, and Japan with wages until age 68 years-old and prices from age on top of AAMs).

In the survey, we further asked economists to indicate whether they were aware of recent changes to indexation practices in the economy they cover.

With those questions, we received responses covering at least 115 and at most 175 economies.[8] Many of them also verified the indexation practices with their national authority counterparts to respond to the survey. The findings of this survey are presented in the next section. Note that the information provided in the next section does not capture the temporary deviations from the customary indexation practices.[9] Furthermore, the results should be interpreted on the understanding that the survey captures the broad approach to indexation rather than an exhaustive account of adjustment mechanisms for the taxes and benefits (which we attempt in Section IV for the accounting exercise). While we separately classify indexation to prices and other variables, indexation also varies by partial and full indexation, forward-looking vs backward-looking, frequency of indexation, the existence of adjusters etc. Those different dimensions were beyond the scope of this survey. Importantly, automatic indexation of expenditure items in our database generally captures both *de jure* as well as *de facto* indexation.

III. Findings

This section presents the main findings of our analysis of the database. We present stylized facts, statistics, and other results through both global maps, and geographic and economic regions (AEs, EMs, and LIDCs).

A. Indexation Across Geographic Regions

Pensions
Figure 1 shows the global distribution of pension indexation in 2022/23 (Panel A) and the evolution of pension indexation over time (between 2002/3 and now) across different geographic regions (Panel B). As observed in the map (Panel A), Europe is the region with the highest degree of indexation, while Sub-Saharan Africa the one with the lowest degree of indexation. Of the 175 economies in our sample: 82 economies (47 percent) have no indexation, 40 (23 percent) economies index only to prices, 15 (9 percent) of them index only to private wages, and the remaining have some form of mixed indexation.

Looking more closely at the trends (Panel B), the number of economies using some type of pension indexation has remained almost constant since 2002/2003 in the Americas, Asia, Europe, and the Middle East. Yet, that number has meaningfully declined in Sub-Saharan Africa, with potential effects on household incomes in the latter sub-continent, including during COVID-19 (Loko, Nembot, and Poplawski-Ribeiro, 2022).

We also find that pension indexation has become less generous over time to minimize fiscal burdens and safeguard financial sustainability. Usually, nominal wage growth (driven by productivity growth) is higher than inflation and, therefore, indexing pensions to wages is more costly for the governments. Consistent with the findings in OECD economies (OECD, 2021),[10] we find that fewer economies index pensions to wages in

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[8] The total number of countries vary across the four budget items, depending on the availability/verification of data.

[9] Examples of deviations include UK's suspension of customary indexation practices in FY2022-23, stoppage of any pension indexation in Greece between 2009 and 2022, and the frequent upward discretionary adjustments in Mexico and Türkiye. (OECD, 2021). In fact, around 40 percent of OECD countries have either frozen benefits or put a cap on benefit increases since 2010 (World Bank, 2021).

[10] Among the OECD countries, 11 countries indexed benefits to prices throughout the whole period, 11 countries made pension indexation less generous, while 5 country made pension indexation more generous.

2022/23 compared to 2002/03, with a shift toward less generous mixed and price indexation across the world.[11] However, in the current scenario where nominal wage increases have lagged price inflation, price indexation may be costlier than anticipated especially given that social security contributions track nominal wage growth (OECD, 2022).

Figure 1: Pensions indexation across the globe in 2023 and its evolution since early 2000s

A. Pensions indexation in 2023 (global map)

B. Evolution of the share of pensions indexation across different geographic regions (percent)
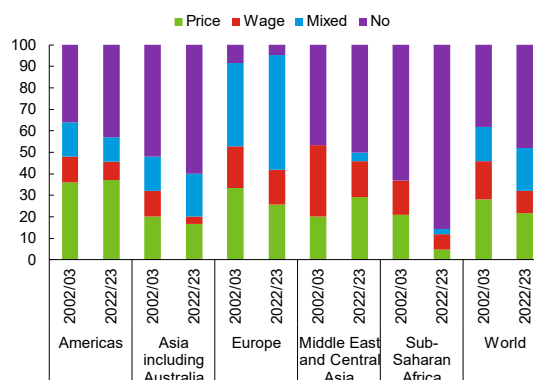
Source: Authors' calculations based on SSA, ISSA, ECB, OECD data, and IMF desk survey.

Social Assistance Programs

Looking at the global maps for social assistance programs (Figure 2), most of the Sub-Saharan Africa and Asia regions have not indexed their social assistance programs. Indexation to either prices or other variables are most common in Europe. It also appears that most of the developed world including North America, Western Europe, Australia, and China have their social assistance programs indexed to prices. Of the 133 economies in our sample: about 89 have no indexation (65 percent), 31 have some indexation to prices (23 percent), and 15 have some indexation to other variables (11 percent).

Some potential factors that could explain the tendency to index pensions more often than social assistance programs include: (i) the social security part of the pension systems is at least partly financed by revenues from pension contributions, whereas social assistance programs are financed out of general tax revenue; (ii) social assistance programs tend to be smaller (in terms of number of beneficiaries), fragmented, and less well-developed in non-AEs compared to pensions; and, importantly, (iii) social assistance programs aim to minimize welfare dependency in the longer term compared to pensions, which is a way to maintain intergenerational fairness (retirees have less capacity to generate additional earned income if benefits get eroded over time).

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[11] Note that these trends do not capture shifts within each the indices itself to alter the generosity. For example, Norway moved from full indexation to wages (*w*) to (*w – 0.75 percent*) from 2000s to 2020s before shifting to an average of nominal wage growth and price growth in 2021.

Figure 2: Indexation of social assistance programs

A. Social assistance indexation in 2023 (global map)

B. Share of social assistance indexation across different geographic regions (percent)

Source: Authors' calculations based on MISSOC, OECD, SSA and ISSA data, and IMF desk survey.
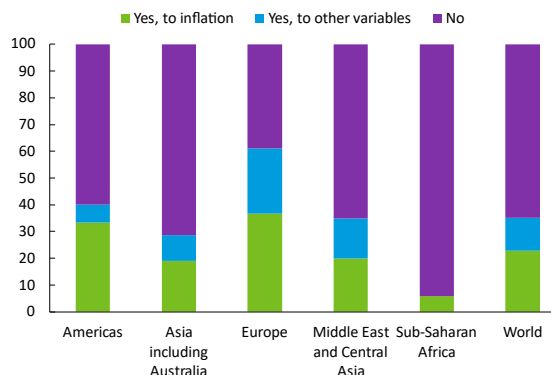
Personal Income Tax (PIT) Threshold

Figure 3 conveys that most governments across the world do not index (or automatically adjusts) its personal income tax brackets thresholds. In fact, in our sample of 173 economies, only 18 economies automatically adjust their thresholds (11 percent), and another 16 economies regularly adjust their thresholds (10 percent), though the process is unclear. Automatic adjustment of thresholds is most common in the Americas. Most economies in Europe have an unclear process around the indexation of PIT thresholds. Almost all of Asia and Africa do not regularly adjust their PIT thresholds. For example, India has not updated its PIT income tax thresholds since FY2016/17, whereas Australia revised its thresholds most recently in 2020-21 with the previous revision in 2012-13. United Kingdom has frozen its income tax thresholds from 2022 to 2028, to aid in its fiscal consolidation efforts.

Figure 3: Indexation of personal income tax thresholds

A. Indexation of PIT thresholds (global map) in 2023
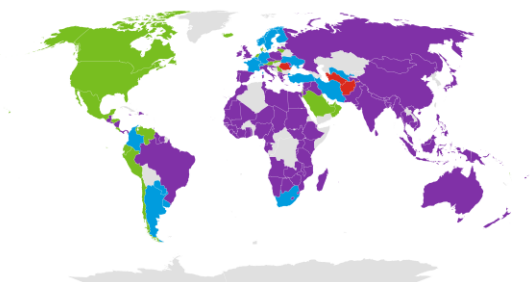
B. Share of PIT indexation across different geographic regions (percent)
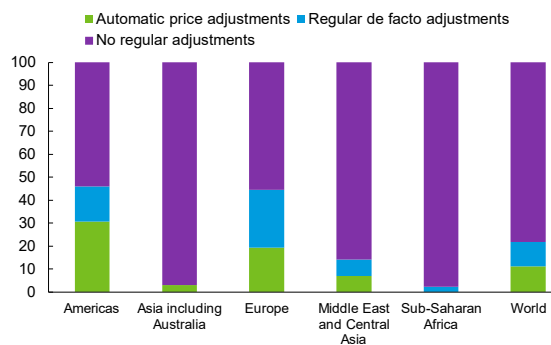
Source: Authors' calculations based on Beer, Griffiths, and Klemm (2023) and IMF desk survey.

Public Wages

Public wages are largely unindexed around the world with only a few economies indexing their public wages to prices or other variables. Leading emerging markets such as India, Mexico, and Türkiye, along with some

advanced economies, such as Belgium, Luxembourg and Malta, index their public wages to prices.[12] Economies in the Eastern Europe (Slovak Republic, Croatia, Serbia) tend to index their public wages to other variables such as growth. Interestingly, our findings contrast with BIS (2022), which reports that indexation practices tend to be more prevalent in Latin America relative to Asia as it has economies with higher inflation history. Note that our data does not capture wage negotiations that consider past/future inflation in the adjustment of wages on a regular basis as these are not automatic (de jure/de facto) indexation.[13] Importantly, our paper does not focus on private wages, which are also consequential for the economy. Yet, Box 1 brings a small discussion about the indexation of minimum wages, which also affect public spending in some economies.

Figure 4: Indexation of public wages

A. Public wages indexation in 2023 (global map)

B. Share of public wages indexation across different geographic regions (percent)
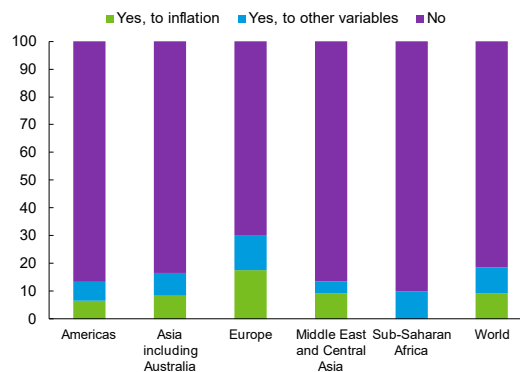
Source: Authors' calculations based on IMF desk survey.

B. Indexation Across Economic Regions

In this subsection, we look how different economies regions—AEs, EMs, and LIDCs—differ in their degree of indexation by budget item.
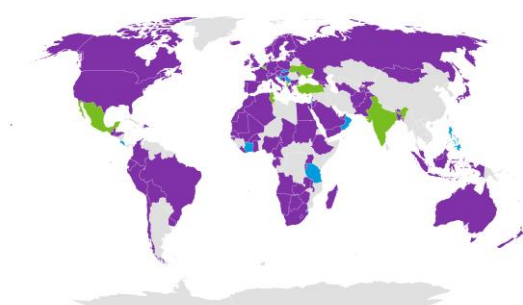
Our main finding is that indexation of budget items varies across the economic regions. It is generally most prevalent in AEs, with the majority of these economies indexing pensions and social assistance programs. Emerging markets, in turn, have a higher proportion of economies that index their public wages.

Indexation of PIT thresholds is most common in AEs, even though still below 50 percent of those economies in the sample. Indexation of PITs is the lowest in LIDCs, where it is below 5 percent of the sample. Less developed economies tend to have lower tax bases with large informal economies. Hence, the bracket creep that arises from infrequent adjustments of thresholds can be an important source of revenue mobilization.

As we already conveyed in the previous subsection, pension is the most commonly indexed budget item across all economic regions. As the pensions chart (Panel 2) in Figure 5 shows, nearly all AEs, about 50 percent of EMs, and 30 percent of LIDCs have some form of indexation. Looking at changes over time (Figure 6), results

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[12] For Russia, while the indexation is not rigorously specified, public sector wages often follow exactly the rate of inflation. However, in the past two years the policy has become more selective and wages on average fell short of inflation. Hence, we consider Russia's wages to not be automatically indexed currently.

[13] For example, the 2023 Public sector wage negotiations in South Africa resulted in a CPI-linked increase in FY2024/25. However, since this is not automatic, we do not consider South Africa to have automatic wage indexation.

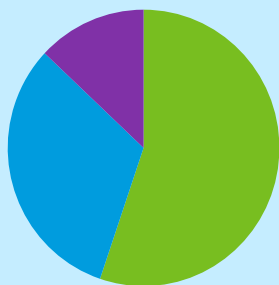show an increase in the degree of indexation in in AEs, but a decrease in EMs and LIDCs. All economic regions tend to have shifted to less generous indexation, with a fewer share of economies indexing to wages.

Box 1: Indexation of Minimum Wages

While our paper focuses on indexation of public wages, this box briefly explores the indexation practices for minimum wages. Adjusting minimum wages with sufficient frequency is important, given that inflation could erode the purchasing power of people working at low-income levels (ILO, 2022). While usually only a relatively small share of employees earns the minimum wage, the indexation of that variable to prices can act as a floor in other wage agreements. Furthermore, increases in minimum wages often play an important role as a general benchmark for sectoral wage agreements in the euro area (Koester and Grapow, 2021). In addition, some economies like the Netherlands use minimum wages to index their pensions and social benefits.

An ILO (2022) report investigated how frequently adjustments are made. It finds that 85 economies (representing 54 percent of economies with statutory minimum wages around the globe) adjusted their minimum wages at least every two years on average during the decade 2010–19. Out of these, about 50 percent conducted these adjustments every year (ILO, 2022). During this period, 49 economies adjusted their minimum wages every three to five years and 20 adjusted less frequently and/or had no adjustments at all. This frequency of adjustment appears to vary across different regions while most frequent in Central Asia and Europe (every 1.9 years), and the least frequent in Africa (average interval of 4.7 years). Asia Pacific and the Americas adjust in average 2.7 and 2.9 years of intervals, respectively. The adjustments also differ based on the economic status of the economy. AEs have been adjusting their minimum wages more frequently, on average every 2 years, whereas LIDCs, possibly due to elevated levels of informality and limited enforcement capacity, are making these adjustments on average every 5 years or more. EMs on average conduct the adjustments every 2.5 to 3.7 years.

■ At least every 2 years ■ Every 3 to 5 years ■ Less frequently

Box Figure 1.1: Frequency of minimum wages adjustments across countries
Source: ILO (2022)

As for other budgetary items covered in this paper, the timing, procedures, and size of increases also matter in what minimum wages are indexed to. Price developments are one of the most considered factors when stakeholders commit to updating minimum wages (OECD, 2015, 2022b; Eurofound, 2022). Some economies in Europe automatically index their minimum wages to prices. In Belgium, all wages are indexed to past CPI (excluding alcohol and narcotics) every time that price index increases by 2 percent or more. In France, only the minimum wage of the bottom quintile is indexed to past CPI, whereas in Luxembourg wages are automatically indexed to past CPI. Poland indexes its minimum wages to future inflation and corrects it the following year if the inflation forecasts differ from the real price index. In turn, in the Netherlands, the minimum wage is indexed to average wage agreements instead of prices.

Despite the prevalence of indexation practices of minimum wages, their hikes often fall short of the rise in prices, which eventually lead to a decrease in real minimum wages (OECD, 2022b). Still, many economists worry that the growth in minimum wages might further lead to rises in prices, even though such a concern is still open for debate. Lindner (2022) estimates that in the UK a 20 percent increase in minimum wages contributed to a rise in inflation of 0.2 percent only. This is in consideration that in the UK, only about 5 percent of workforce is renumerated with the minimum wage (Francis-Devine, 2023). So, this effect is possibly multiplied in economies with a higher share of population working at the minimum wage. Similarly, Koester and Grapow (2021) argue that the likelihood of wage-price spiral is relatively limited in the euro area given the current extent of indexation. In contrast, using micro data from France, Gautier, Roux and Castillo (2022) document that minimum wages contribute to amplifying the response of wages to past inflation.

Indexing social assistance benefits is more common in AEs, where over 65 percent of economies index some or any of such programs to either prices or other variables including average/minimum wages. Most economies

in both EMs and LIDCs, in turn, do not index their social benefits. These social benefits primarily include disability allowance, old-age allowance, childcare benefits, and unemployment benefits.

Figure 5. Budget items indexation and its evolution across income groups (*Percent*)
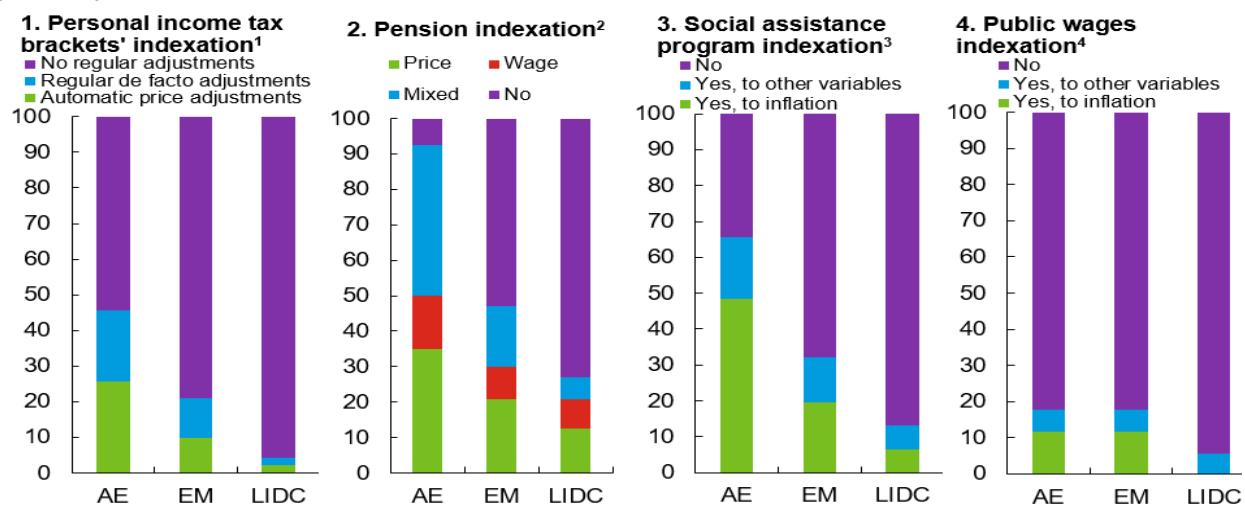
Source: Authors' calculations based on Beer, Griffiths and Klemm (2023), SSA, ISSA, MISSOC, and IMF desk surveys.

Figure 6: Evolution of the share of pensions indexation across economic regions (percent)

Source: Authors' calculations based on SSA, ISSA, MISSOC, and IMF desk surveys.

Amongst the four budgetary items this paper focuses on, public wages are the least indexed globally. Nearly 80 percent of the economies in the sample do not index their public wages. In cases where public wages are indexed, they are mostly indexed to either private wages or other economic variables and indexation of wages seems to be more popular in EMs compared to AEs or LIDCs.

C. Indexation and Government Effectiveness

This subsection investigates statistical correlations between some governance characteristics of the economies in the sample and indexation practices. For this we merge our dataset with the government effectiveness indicator from the Worldwide Governance Indicators (Kaufmann, Kraay, and Mastruzzi, 2010). The government effectiveness characteristic captures a government's capacity to effectively formulate and implement sound policies. It considers perceptions of the quality of public and civil services and their independence from political pressures along with the quality and credibility of policy formulation and implementation (Kaufmann, Kraay, and Mastruzzi, 2010). The scale ranges from -2.5 (lowest) to 2.5 (highest).

Figure 7 suggests a positive correlation between government effectiveness and indexation in the public sector, particularly for indexation of social assistance programs and public wages. Economies that are deemed more effective (i.e., with scores in the upper half of this indicator)—which is also correlated with the economy's degree of development—use more frequently some form of indexation practices, notably for social assistance programs and public wages.

Figure 7: Indexation trends based on government effectiveness (unit values)
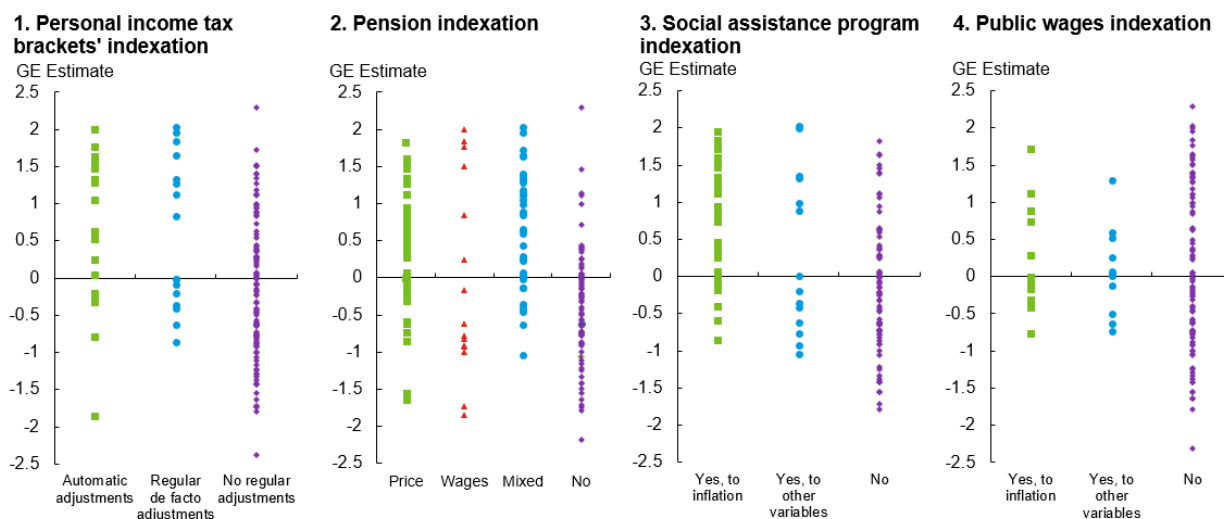
Source: Authors' analysis based on Beer, Griffiths and Klemm (2023), SSA, ISSA, MISSOC, IMF desk survey, and Worldwide Governance Indicators (2021).
Note: The government effectiveness estimate ranges in unit values from -2.5 (lowest) to 2.5 (highest).

Another governance measure used to investigate statistical correlations with indexation practices is budget transparency. Here, budget transparency is measured through the Open Budget Index (OBI) from the International Budget Partnership (2021). The OBI is an indicator for central government budget transparency and is based on three main pillars: budget transparency, budget participation, and budget oversight. The index ranges from 0−100 based on the scores received by each economy on different survey questions related to budget formulation and implementation process.

The charts in Figure 8 reveal that, as expected, a higher budget transparency is positively correlated with more indexation. Both, budget transparency and indexation, assist further in the implementation of fiscal policy, including in LIDCs, which is in line with the related literature (e.g., Lledó and Poplawski-Ribeiro, 2013). Indexation of PIT is more common in economies with higher OBI. Moreover, regular (*de facto*) adjustments are more prevalent as OBI increases. In case of pensions indexation, economies with OBI in the highest quadrant (75-100) have mixed types of pensions indexation. Pensions indexation is lowest in economies with lower OBI scores. Social assistance programs, if indexed, generally seems to be indexed to prices, although economies with higher OBI tend to index their programs more often. Indexation of public wages is less common across the OBI scores, and if indexed, are mostly indexed to variables other than prices.
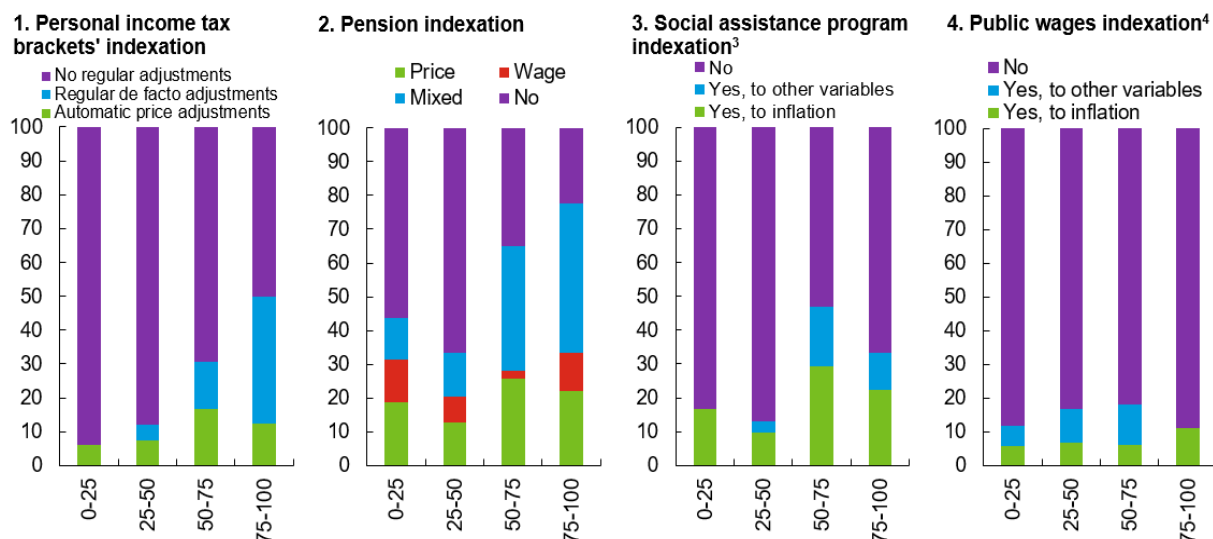
Figure 8: Indexation trends based on budget transparency (percent)

Source: Authors' analysis based on Beer, Griffiths and Klemm (2023), SSA, ISSA, MISSOC, IMF desk survey, and Open Budget Index 2021 (IBP, 2021).
Note: The OBI ranges from 0−100.

D. Indexation and Economic and Political Stability

In this subsection, we investigate another factor that possibly correlates with the implementation of indexation policies. We compare indexation status across fragile and conflicted states (FCS) and non-FCS EMDEs and LIDCs.[14] The IMF classifies member states as FCS if the economy (i) has a Country Policy and Institutional Assessment (CPIA) score of below 3 (from a maximum of 6); or (ii) has presence of UN peace operation in the past 3 years; or (iii) has refugees of 2,000 or more per 10,000 population across international borders; or (iv) is identified as a country in conflict based on the number of conflict deaths in absolute terms and relative to their population (IMF, 2023b). As expected, indexation is more common in stable economies than economies that are fragile and/or are in conflict (Figure 9).

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[14] FCS includes Afghanistan, Burkina Faso, Burundi, Cameroon, Central African Republic, Chad, Comoros, Democratic Republic of the Congo, Republic of Congo, Ethiopia, Guinea-Bissau, Haiti, Iraq, Kosovo, Lebanon, Libya, Mali, Marshall Islands, Micronesia, Mozambique, Myanmar, Niger, Nigeria, Papua New Guinea, Solomon Islands, Somalia, South Sudan, Sudan, Syria, Timor-Leste, Ukraine, Venezuela, West Bank and Gaza, Yemen, and Zimbabwe.

Figure 9: Indexation trends based on government stability (percent)
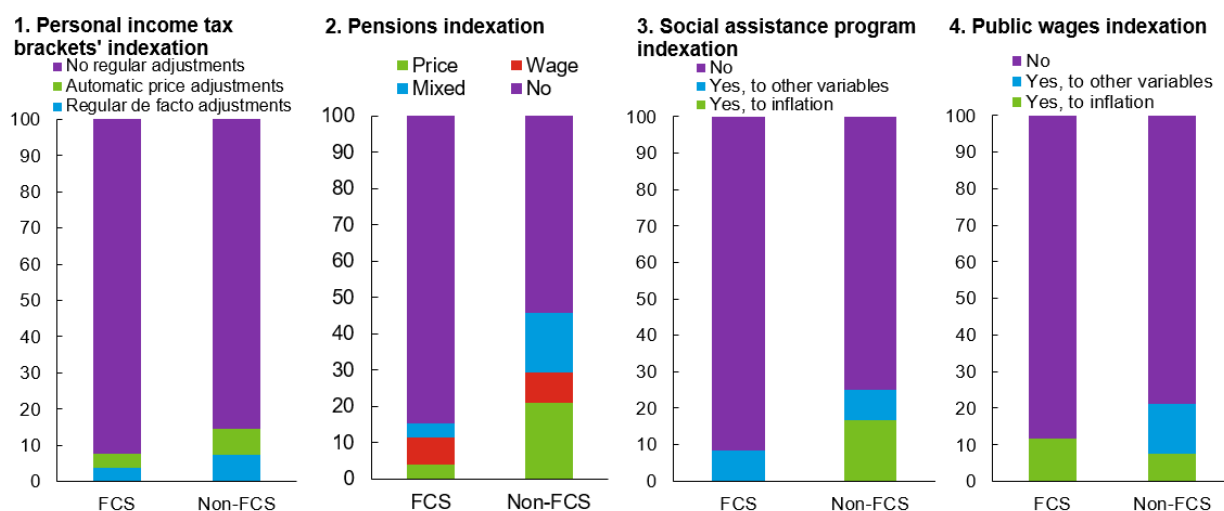
Source: Authors' calculations based on Beer, Griffiths and Klemm (2023), SSA, ISSA, MISSOC, IMF desk surveys, and IMF (2023b).

Note: FCS= Fragile and Conflicted States**.**

E. Indexation and Country Size and Resource-rich Economies

The next statistical analysis looks into the correlation between indexation practices and either country size or the fact that the economy is rich in natural resources.

The IMF classifies non-AE and non-high-income fuel-exporting member states with populations less than 1.5 million as small developing states (IEO, 2022)[15]. Figure 10 shows that indexation practices are generally more common in larger states.[16] No small and developing state (SDS) has indexed the PIT thresholds (see Annex I for details by economy). While indexation of pensions is still generally more common in non-SDS, a higher proportion of SDS has indexed their pensions to prices compared to non-SDS. Indexation of pensions to a combination of prices, wages and other variables seem to be a commonly adopted policy in non-SDS. Roughly, the same proportion of economies across the two groups seem to have their social assistance programs indexed to the price level, but a higher percent of non-SDS economies have indexed these programs to variables other than the price level. More consequentially, public wages have a higher degree of indexation among SDS than in larger economies. They also tend to be indexed to variables other than prices in SDS. In non-SDS, in turn, there is an equal share of indexation of public wages to prices and other variables.

We further analyze the correlation between resource-rich economies and indexation. For that, we investigate a group of 51 economies classified as resource-rich countries (RRC) given that at least 20 percent of their exports or fiscal

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[15] Small developing states include Antigua and Barbuda, the Bahamas, Barbados, Belize, Bhutan, Cabo Verde, Comoros, Djibouti, Dominica, Eswatini, Fiji, Grenada, Guyana, Kiribati, Maldives, Marshall Islands, Mauritius, Micronesia, Montenegro, Nauru, Palau, Samoa, Sao Tome & Principe, Seychelles, Solomon Islands, St. Lucia, St. Kitts & Nevis, St. Vincent & the Grenadines, Suriname, Timor-Leste, Tonga, Trinidad and Tobago, Tuvalu, and Vanuatu.

[16] Larger economies also tend to have less volatile government spending (Furceri, Kiliç Çelik, and Poplawski-Ribeiro, 2016).

revenues come from nonrenewable natural resources such as oil, gas and metals (IMF, 2015).[17] Due to such reliance on revenues generated through exports of commodities, these countries are especially susceptible to booms and busts in the commodity markets. This volatility in revenues as well as the fact that these economies tend to be EMs instead of AEs make it less likely that they will keep budget outlays indexed, including to the price level.

Figure 10: Indexation trends based on country size (percent)
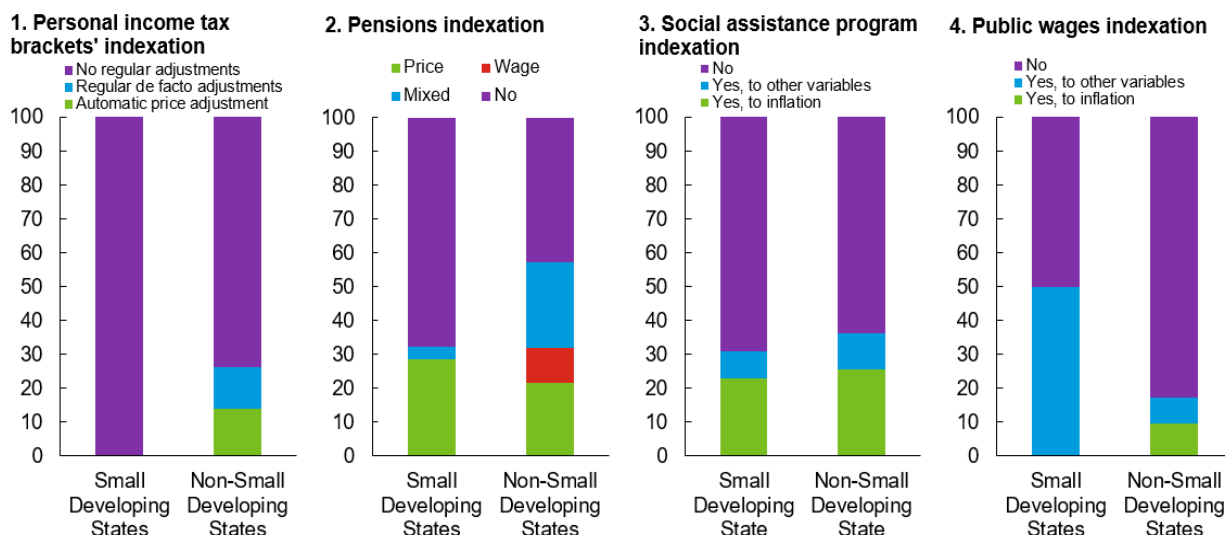
Source: Authors' calculations based on Beer, Griffiths and Klemm (2023), SSA, ISSA, MISSOC, IMF desk surveys, and IEO (2022).

Figure 11: Indexation trends based on resources (percent)
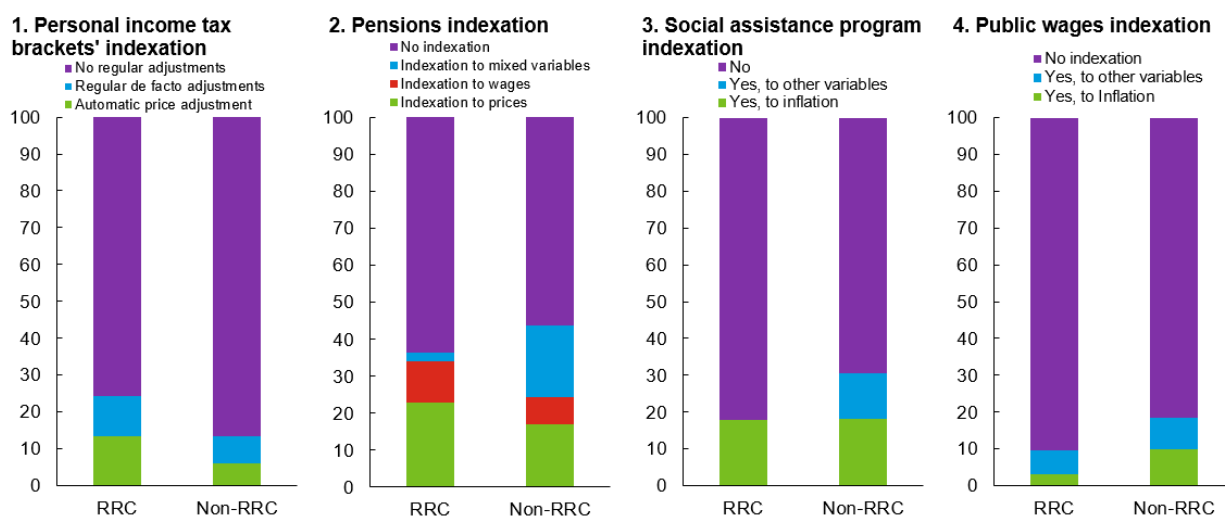
Source: Authors' calculations based on Beer, Griffiths and Klemm (2023), SSA, ISSA, MISSOC, IMF desk surveys, and IMF (2015).
Note: RRC=Resource-Rich Countries.

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[17] We use IMF WEO data to verify these criteria. The group of resource-rich countries include: Algeria, Angola, Australia, Azerbaijan, Bahrain, Bolivia, Botswana, Brunei Darussalam, Cameroon, Canada, Chad, Chile, Colombia, Democratic Republic of the Congo, Republic of Congo, Côte d'Ivoire, Equatorial Guinea, Ecuador, Gabon, Ghana, Guinea, Guyana, Indonesia, Iran, Iraq, Kazakhstan, Kuwait, Libya, Mali, Mauritania, Mexico, Mongolia, Mozambique, Nigeria, Norway, Oman, Papua New Guinea, Peru, Qatar, Russia, Saudi Arabia, South Africa, Sudan, Suriname, Syria, Timor-Leste, Trinidad and Tobago, United Arab Emirates, Venezuela, Yemen, and Zambia.

Figure 11 reflects this finding. RRCs are less likely to have their pensions, social assistance programs and public wages indexed, compared to their non-RRCs. However, indexation of PITs appear to be more prevalent in both RRCs than in non-RRCs.

IV. Data Application: Indexation and Fiscal Outcomes Via an Accounting Exercise

In this section, we use simple calculations to illustrate the meaningful impact of indexation on fiscal performance during periods of high inflation for select economies. The results highlight how the impact of indexation on fiscal variables depend on the frequency, choice of indices, and the degree of indexation.

Accounting Model

As in IMF (2023),[18] we use an accounting exercise under some simplifying assumptions to quantify the "immediate" effects of 2022 inflation surprises on primary balances and debt-to GDP due to indexation practices across select economies,

The effect of an inflation surprise on nominal revenues and expenditures is given by:

$$\Delta\,(r - x) = \Delta\pi^{def} * \epsilon^r r - \Delta\pi^{cpi} * \sum_i \epsilon_i^x x_i \qquad (1)$$

where r is revenue, x primary expenditure, with i indexing individual expenditure items, $\Delta\pi^{cpi}$ the CPI inflation surprise, $\Delta\pi^{def}$ the GDP deflator surprise, ϵ^r the revenue elasticity to inflation, and ϵ_i^x the primary expenditure item elasticity to inflation.

Equation (1) assumes that expenditure responds to CPI inflation and revenue responds to the GDP deflator surprise. The elasticity ϵ_i^x differs by economy and expenditure item. We assume non-indexed primary expenditure is fixed in nominal terms—i.e., there is no active policy accommodation ($\epsilon_{non-indexed}^x = 0$)—and indexed primary expenditure responds to the relevant CPI shock for each expenditure item one-to-one ($\epsilon_{indexed}^x = 1$), although potentially not in the concurrent year. For expenditures, we focus on the costs from wages, pensions, and social protection programs indexation to prices. For revenues, we only estimate the gains from bracket creep in PIT and this channel is captured by $\epsilon^r > 1$.

Table 1 summarizes for selected economies the budget items that are affected by indexation, the relevant inflation measure for indexation in each case, and the timing of indexation. In many of them, indexation only increases expenditure the year after the inflation surprise, as indexation is based on the realized price level during the previous year. In other economies, though, expenditure is updated with inflation outturns or forecasts within the fiscal year, leading to a negative primary balance effect in the year of the inflation surprise. Tax bracket creep usually increases the primary balance the same year of the inflation surprise. Note that even for economies that regularly revise their income tax thresholds, the thresholds are updated prior to the beginning of the tax year. So, it misses the increase in wages during the year driven by the inflation surprise.

Using the information in Table 1 and applying it to Equation (1), Figure 12 shows how indexation of tax brackets and expenditure items (public wages, pensions, and social transfers) impact primary balances across a select group of economies at different income levels.[19] The effects of indexation in the sample are strongest for those economies that automatically index their wage bill, such as Belgium, followed by those that index their

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[18] See Online Annex 1.4 of IMF (2023) for a similar calculation.

[19] Another mechanism by means of which the fiscal drag can materialize is the existence of deductions that decrease as income increases in national taxation systems.

pensions and have a large pension expenditure, such as Italy. For EMs, the impact of indexation is small because the inflation surprises were generally smaller, excepting in Türkiye. Across economies, the impact of indexation of social transfers is small because they account for a small share of expenditure.

Table 1. Indexation of Expenditure Items and Tax Brackets and Impact on Primary Balances, FYs 2022 and 2023

	PRIMARY SPENDING			REVENUE
	Wage bill	**Pensions**	**Social grants**	**Personal Income Tax Bracket Creep**
United States	No automatic indexation	Impact in FY23 (October-September) as the Old-Age and Survivors Insurance (OASI) benefits are updated in October based on CPI-W inflation for the 12 months ending in June with the benefits increase taking effect in January. The inflation surprise is the difference between the actual outturn in June 2022 and the projected yoy inflation for Q2 2022 by CBO in July 2021.	Impact in FY23 as SNAP benefits are updated in October based on food inflation for the 12 months ending in June, and the Social Security Insurance (SSI) and disability allowance is adjusted based on CPI-W (same as the OASI).	Impact in 2022 due to higher expected average wage growth compared to the increase in income tax brackets announced in October 2021 for 2022 tax year (January-December). Estimated using the real bracket creep estimates from the 2022 Long-Term Budget Outlook of the Congressional Budget Office (CBO).
United Kingdom	No automatic indexation	Impact in FY2023-2024 (April 6-April 5) as the triple lock (highest of either earnings, Consumer Prices Index inflation, or 2.5 percent) is applied on the state pension in April 2023 based on September 2022 CPI.	Impact in FY2023-2024 from the automatic indexation of disability benefits, carers' allowance, guardians', the industrial injuries disablement benefit and additional state pensions under the old state pension to the September CPI, which will be adjusted in April 2023. The other allowances are not automatically linked, hence the impact of the surprise inflation on these benefits is not incorporated, but the practice has been to increase in line with inflation.	Impact in FY2022-2023 as income tax brackets were maintained at the FY2021-2022 level. Estimated using the projected gains from bracket creep in the "Policy decisions at Budget 2021" as a share of average earnings growth projected for this period multiplied by the difference between the most recent average earnings growth projection in November 2022 compared to March 2021 for FY2022-2023 from the Office of Budget Responsibility Economic and Fiscal Outlook.
Germany	No automatic indexation.	No automatic indexation to prices.	No automatic indexation to prices.	Impact in 2022 due to higher expected average wage growth. The bracket creep elasticity is estimated using the estimated income losses in the Budgetary Plan 2023 from revising the income thresholds in 2023 and this is multiplied by the difference in compensation per employee for 2022 estimated in the Budgetary Plan 2023 compared to the projection for 2023.
France	No automatic indexation	Impact in 2023 as the basic pensions (about 67 percent of the total pension bill) are automatically indexed to CPI (excluding tobacco) on 1 January. The inflation shock is measured as the difference in the actual outturn minus the HCPI	Impact in 2022 as social benefits are adjusted around the mid-year, depending on the type of allowance and some are backward-looking (means-tested allowances) while others are forward-looking (family benefits). As a proxy for the inflation surprise, we take the	Impact in 2022 due to higher expected average wage growth. The bracket creep elasticity is estimated using the estimated income losses in 2023 from revising the income thresholds and this is multiplied by the difference in the estimated GDP deflator for 2022 in October 2022 WEO compared to the October 2021 WEO projection.

	projection of Bank of France in December 2021.	difference between the June 2022 forecast and December 2021 forecast of HCPI projection of Bank of France. Spending on Family Allowances, Disability Benefits and Income Maintenance from the OECD Social Expenditure Database is included.	
Italy	No impact in 2022-23 as unexpected inflation in a given three-year contract period is compensated during the following three-year period and the next agreement with the Public Sector Unions Federation covering 2022-2024 will be in May 2024.	Impact in 2023 as most pensions (those below a specified threshold) are fully indexed and those pensions higher than a specified threshold are instead subject to partial indexation. [20] The relevant index is the CPI for white- and blue-collar workers, excluding tobacco products. At the aggregate level the effective indexation rate is close to 100 percent of the previous-year inflation. The inflation shock is calculated as the difference between the projected increase in benefit size in the 2023 Budget (i.e., the actual increase) and the HICP projection in December 2021 for 2022 (i.e., expected increase prior to inflation surprise).	Same as Pensions. Spending on Family Allowances, Care Allowances, and Disability Benefits is included from the OECD Social Expenditure Database.	Impact in 2022 as income tax brackets were maintained at the 2021 level. The bracket creep elasticity is proxied by the average of US, UK, Germany, and France and this is multiplied by the difference in the projected deflator for 2022 in the October 2022 WEO compared to the October 2021 WEO to estimate the impact of bracket creep.
Belgium	Adjusted by 2 percent two months after the cost-of-living measure "smoothed health index" reaches a threshold called the "pivot index". The health index is equal to the CPI excluding alcohol, tobacco and fossil fuels and the smoothed health index is the four-month moving average of the health index. See Pensions for details on the impact of the inflation surprise in 2022.	Adjusted by 2 percent from the month following the month in which the "smoother health index" reaches the "pivot index". The "pivot index" was breached five times in 2022 - the last one in November 2022 compared to a baseline assumption of one breach in 2022 without the inflation surprise.	Same as Pensions. Spending on Family Allowances and Disability Benefits is included from the OECD Social Expenditure Database.	Impact in 2022 due to higher expected average wage growth compared to the increase in tax brackets announced in end-2021 for 2022. The bracket creep elasticity is proxied by the average of US, UK, Germany, and France and this is multiplied by the difference in the projected deflator of October 2022 WEO for 2022 compared to the actual increase in tax brackets to estimate the impact of bracket creep.
Tanzania	No automatic indexation	No automatic indexation	No automatic indexation	Impact in 2022 as income tax brackets were maintained at the 2021 level. The bracket creep elasticity is proxied by the measure estimated for South Africa and adjusted by the relative share of personal income tax revenues to GDP of Tanzania compared to South Africa. The estimated elasticity is multiplied by the difference in the projected deflator of October 2022 WEO for 2022 compared to the October 2021 WEO for 2022.
Brazil	No automatic indexation	Impact in 2023. Pension benefits are adjusted in tandem with the minimum wage. Normally the minimum wage is adjusted annually on May 1st of each year based on (at least) the	No automatic indexation	Income in 2022 as tax brackets have not been adjusted in 5 years. The bracket creep elasticity is proxied by the measure estimated for South Africa and adjusted by the relative personal income tax revenues to GDP of Brazil compared to South

[20] The degree of indexation has been decreased for higher pensions with the Budget Law for 2023.

		CPI of end-December of the previous year plus some ad hoc adjustment passed in Congress.		Africa. The estimated elasticity is multiplied by the difference in the projected deflated of October 2022 WEO for 2022 compared to the October 2021 WEO for 2021.
Türkiye	Impact in 2022 from the higher than envisaged increase in wages (reflecting a higher than expected inflation rate) in the second-half of the year. The wages are adjusted twice a year (January and July), reflecting the previous 6-month inflation rate.	Impact in 2022 as pensions are adjusted twice a year along with the wages of government employees.	No automatic indexation	Impact in 2022 as income tax brackets were maintained at the 2021 level. The bracket creep elasticity is proxied by the measure estimated for South Africa and adjusted by the relative share of personal income tax revenues to GDP of Turkey compared to South Africa. The estimated elasticity is multiplied by the difference in the actual public sector wage increase in 2022 compared to the projected increase in end-2021.
South Africa	No automatic indexation	No automatic indexation	No automatic indexation	Impact in FY2022 (April-March) due to higher expected average wage growth compared to the increase in income tax brackets announced in March 2021 for FY2022. The bracket creep elasticity is based on the bracket creep estimates in the FY2022 budget, and this is multiplied by the difference in the projected deflator for 2022 from the October 2022 WEO compared to the October 2021 WEO.
Mexico	Impact in 2023 as wages will increase by inflation in January of each successive year. The inflation surprise is measured by the difference in estimated inflation for 2022 in November 2022 AIV compared to the projection in November 2021 AIV.	Impact in 2023 as pensions will increase by inflation in January of each successive year. The inflation surprise is measured by the difference in estimated inflation for 2022 in November 2022 AIV compared to the projection in November 2021 AIV.	No automatic indexation	Impact in 2022 as income tax brackets were maintained at the 2021 level. The bracket creep elasticity is proxied by the measure estimated for South Africa and adjusted by the relative share of personal income tax revenues to GDP of Mexico compared to South Africa. The inflation surprise is measured by difference in the estimated deflator in 2022 from the November 2022 AIV compared to the projection in November 2021 AIV.
India	Impact in FY2022/23 (April-March) is measured by the change in the Dearness Allowance (calculated as a percentage of the basic salary) which is adjusted in July and January, reflecting the previous 6-month inflation rate based on All India Consumer Price Index for Industrial Workers (AICPI).	Impact in FY2022/23 is measured by the change in the Dearness Relief (calculated as a percentage of the basic pension) which is adjusted in July and January, reflecting the previous 6-month inflation rate based on All India Consumer Price Index for Industrial Workers (AICPI).	No automatic indexation	Impact in 2022 as income tax brackets were maintained at the 2021 level.[21] The bracket creep elasticity is proxied by the measure estimated for South Africa and adjusted by the relative share of personal income tax revenues to GDP of India compared to South Africa.[22] The inflation surprise is measured by the difference in the estimated deflator for 2022 from the October 2022 WEO compared to the projection in October 2021 WEO.

Sources: Based on the indexation practices identified in the previous section, with details on the indexation practices, inflation surprises, and budget items retrieved from relevant government websites (Social security websites, Budget

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[21] India introduced a second PIT regime starting in FY2020/21 which lowered the applicable rates but removed most deductions and exemptions. For simplicity, we assume old regime in our calculations. In FY2023/24 this regime became the default regime.

[22] Using South Africa's elasticity would likely result in an upper bound estimate for India. Specifically, due to the high tax-free thresholds, India's PIT taxpayer base is narrower than other EMs and concentrated at the higher end of the income distribution. Furthermore, India's old regime has only three 4 tax brackets compared to 7 in South Africa, reducing the scope for bracket creep. The latter is also relevant for other EMs – Tanzania, Türkiye, and Brazil (5 tax brackets) and Mexico (3 tax brackets), In addition to the number of tax brackets, large differences in rates between brackets would also amplify the gains from bracket creep (Beer, Griffiths, and Klemm, 2023).

offices, Central Banks), OECD Social Expenditure Database, and IMF country teams as indicated in each of the boxes.

Note: In economies where the adjustments take place in the middle of a fiscal year, the size of the impact is adjusted accordingly. For example, in the US, where social benefits are adjusted in January every year, the annual impact is weighed by 3/4 to align with the fiscal year that runs from October to September.

Figure 12. Contribution of FY2022 inflation surprises to FY2022 and 2023 primary balances through indexation of expenditure items and tax bracket
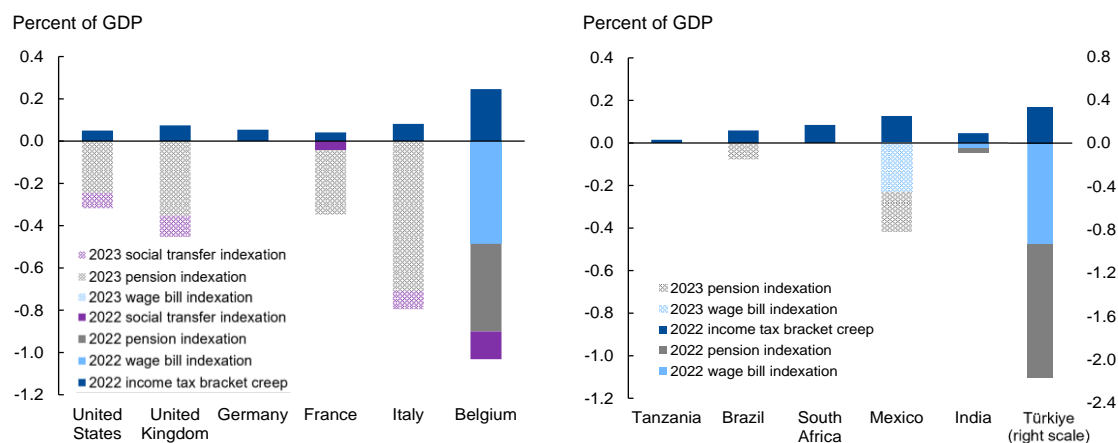
Sources: Authors' calculations based on data referenced in Table 1. See Annex III for details. Note: The reference point is the FY 2022 budget that was announced towards end-2021/early-2022 prior to the inflation surprise. Estimates are based on economy-specific automatic indexation practices and do not include discretionary adjustments that economies have made in response to the inflation surprise. Social transfers only include programs that have automatic indexation. Estimates for bracket creep use changes in average earnings if available and the GDP deflator surprise otherwise. The contribution of expenditure items is based on the CPI measure used for indexation in each economy.

While the results in Figure 12 indicate that the first order effects of indexation is a deterioration of the fiscal balance during periods of inflationary shocks (primarily through additional expenditures), the overall impact of inflationary shocks on fiscal balance tends to be mixed. Garcia-Macia (2023) finds short-term improvements in the fiscal balance after accounting for the increase in the tax base and delayed catch up of total expenditure which includes the non-indexed items using historical data.[23] In contrast, Bankowski and others (2023) find that the recent inflation surge (during 2022-23) resulted in an adverse impact on the euro area budget balance, with the spending pressures driven by indexation more than offsetting the benefits on the revenue side.[24] The relatively less degree of indexation in EMs compared to AEs identified in our paper could partly explain the stronger gains in overall balance for the former compared to the latter during periods of inflationary surprises (see also IMF, 2022).

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[23] Indexation of pensions could also result in higher income tax revenue and larger tax bases. The accounting exercise in this paper does not capture these second-order effects of indexation.

[24] The overall slight adverse impact of inflation on public finances is a result of the nature of the inflation surprise. The inflation surprise during 2022-23 in the Euro area was predominantly originating from an external supply shock, which leads to more limited gains on the revenue side that can easily be outweighed by extra spending pressures.

V. Data Application: Inflation Persistence and Indexation

A major concern with public wage and price indexation of expenditure items is its potential to make inflation more persistent in the economy. Given the size of the government and the fact that some of the contracts may follow those public prices, indexation of public spending may cause inflationary inertia and an increase in backward-looking inflation expectations in various economies (Ascari and Sbordone, 2014).

Using our database, this section performs a statistical analysis of the relationship between indexation and inflation persistence between the years 2018 and 2020. For that, we first measure the combined degree of indexation of the three public spending items by weighting the different levels of indexation of each budget item in each economy *i* in our sample. The weighting methodology follows Balasundharam and others (2024) and is described below.

$$Weighted\ Indexation_{it} = \frac{wagebill_{it}}{total\ current\ spending_i} Index_{it}^{wage} + \frac{pensions_{it}}{total\ current\ spending_{it}} Index_{it}^{pensions} +$$
$$\frac{social\ assistsance_{it}}{total\ current\ spending_{it}} Index_{it}^{social\ assistance}. \tag{2}$$

where, *Weighted Indexation* ranges between 0 and 1 and *Index* is a dummy that equals 1 if there is some indexation to inflation in the particular spending item for each economy *I* and year *t.*

Figure 13 presents the sample's characteristics for weighted indexation described by Equation (2). There are in total 58 economies in the sample (27 AEs, 23 EMs, and 8 LIDCs). The average weighted indexation is 0.13 with the maximum weighted indexation happening in Cyprus during the period analyzed (2018–2020) with 59 percent of its total current spending in a given year having some indexation. Annex IV further presents the most recent values of the weighted indexation per economy, listing the economies in decreasing order of indexation values.

Figure 13: Sample characteristics for weighted indexation (unit values)
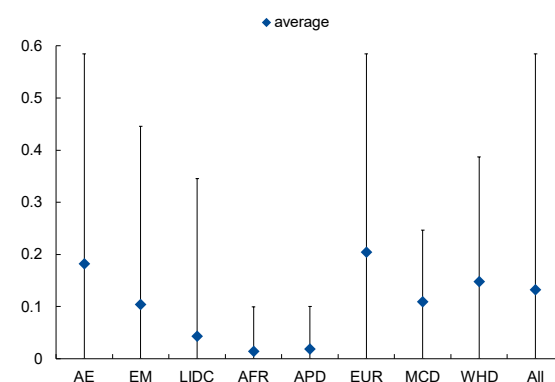
Source: Authors' calculations based on data collected from Government Financial Statistics and World Economic Outlook.

Given this "overall" measure of indexation to inflation, we then proceed to calculate inflation persistency in our sample. The first statistical measure that we use to capture inflation persistency is the *Hurst exponent.* This is statistical measure assesses the long-term memory or self-similarity of a time series or a stochastic process, help identifying whether a process or time series is trending, mean-reverting, or purely random.

The calculation of the Hurst Exponent uses an ARFIMA model which estimates the parameters of autoregressive fractionally integrated moving-average specifying that:

$$y_t = (1 - L)^{-d}\{\rho(L)\}^{-1}\theta(L) \in_t$$

where *ρ(L) = (1 − ρ₁L − ρ₂L² − · · · − ρₚLᵖ)* is the autoregressive (AR) polynomial in the lag operator *L; θ(L) = (1 + θ₁L + θ₂L² + · · · + θₚLᵖ)* is the moving-average (MA) lag polynomial; ϵ_t is the independent and identically distributed innovation term; and *d* is the fractional-integration parameter that captures the long-run dependence of observable time-series variable (*y*)—i.e., the persistence of the variable *y.*

The fractional-integration parameter d is estimated using the monthly inflation data between January 2018 to December 2022 (for more details, see Ha and others, 2023). We then add 0.5 to determine the Hurst Exponent (H)—i.e., *Hurst exponent = d + 0.5*. A Hurst exponent value above 0.5 indicates a persistent time series. The larger the H value, the stronger the trend. A Hurst exponent value between 0 and 0.5, in turn, indicates an anti-persistent time series. The closer the value is to 0, the stronger is the tendency for the time series to revert to its long-term means value. Finally, a Hurst value of 0.5 indicates a random walk process, whereas a H value closer to 1 indicates a high risk of large and abrupt changes.

Figure 14 (Panel A) shows the Hurst Exponent values for inflation in our economy and period sample. Among the 53 economies included in our calculations, the highest average H value for inflation persistence is observed amongst AEs and EMs, whereas the lowest average H is observed among LIDCs.

The average Hurst Exponent between 2018 and 2022 for our economy samples is positively correlated with our weighed index of inflation indexation in public spending (Figure 14, Panel B). The chart shows that the majority of the economies sampled have experienced persistent inflation with the Hurst Exponent being on average above 0.5 between the months of January 2018 and December 2022. An increase in share of indexed public spending by 10 percent is correlated with an increase in Hurst exponent of 0.05 (i.e., more persistence). Moreover, it is also interesting to notice that, even economies with no indexation of public spending to inflation tend to have, on average, persistent inflation: the y-intercept in the chart is approximately 0.6.

Figure 14: Analysis of persistent inflation and indexation using the Hurst Exponent (unit values)

A. Average Hurst Exponent across regions

B. Correlation of the Hurst Exponent and indexation
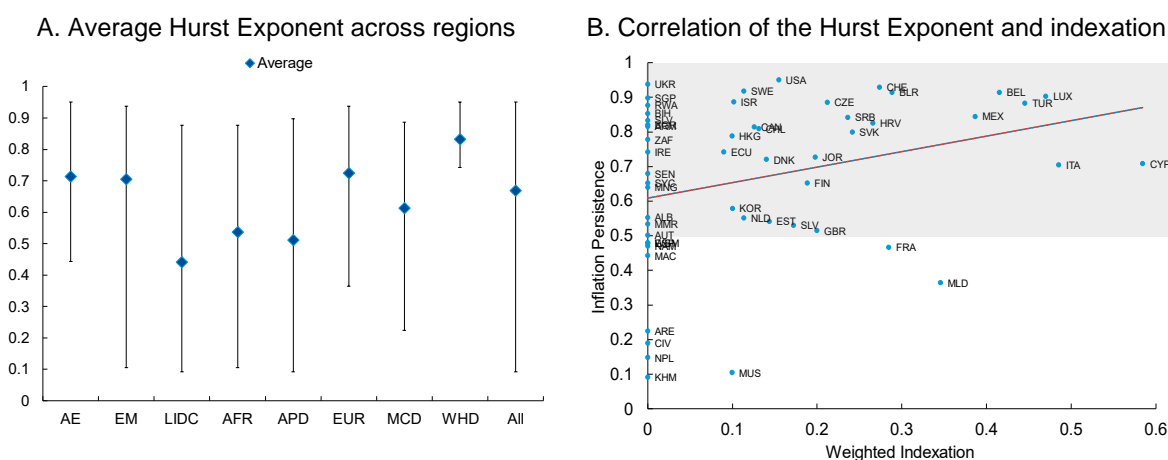
Source: Authors' calculations based on Ha et al (2023).

Another common practice to measure inflation persistency is via the estimation of a univariate autoregressive (AR) time series model. Persistence is then measured as the sum of the estimated AR coefficients for each period investigated. That cumulation approximates the long-run impulse response of inflation to its initial shock. A time series (inflation in this case) is classified as relatively persistent if the correlations with its own past decay slowly—i.e., the sum of the AR coefficients is high.

So, through this method, we measure inflation persistence by cumulating the AR coefficients of the first 12 periods (months) using monthly inflation data between 2018 and 2022 for 58 economies. If the cumulative sum of AR coefficients is greater than 1, it suggests that the time series exhibits explosive behavior and diverges from its mean. This indicates strong persistence, but in an increasing direction.

Figure 15 shows that inflation is strongly persistent in our sample, including for economies with zero or very low indexation to inflation, or for averages of different economy groupings. Moreover, Figure 15, Panel B, corroborates the positive correlation between inflation indexation and persistence. The scatter plot suggests that a rise in share of public spending that is indexed to inflation by 10 percent augments the sum of AR coefficients by 0.26[25].

Figure 15: Analysis of persistent inflation and indexation using autoregressions (unit values)

A. Average AR(12) estimates across regions

B. Correlation of the AR(12) and indexation
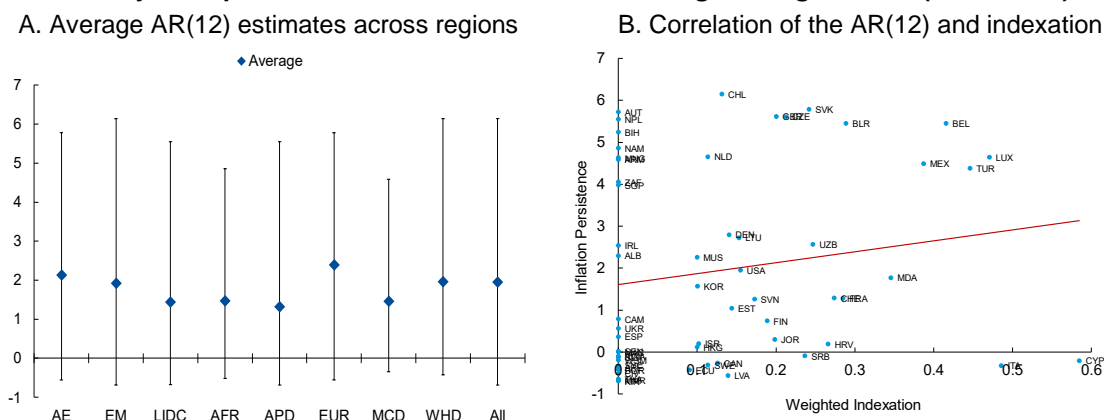
Source: Staff estimates using Ha and others (2023) for the monthly inflation data, World Economic Outlook, Government Financial Statistics.

In conclusion, by measuring inflation persistency via both the Hurst Exponent and the autoregressive estimation, we find a positive correlation between indexation to inflation practices and inflation persistence.

VI. Conclusions

Indexation of budgetary items to the price level and other nominal variables has a long history in public finances. Particularly in the case of politically salient expenditure items such as pensions or wages, their indexation is often a prominent topic in public discourse. Given the recent upsurge in inflation, the largest in more than three decades, it is important to understand the current state of indexation of some main budget items.

This paper investigates current international practices of indexation presenting a new and unique dataset of indexation of four budget items: (i) personal income taxes, (ii) pensions, (iii) social assistance programs, and (iv) public wages. This is done in two steps. First, we review the academic literature, and select official multilateral and governmental documents reporting on the status of indexation for the four fiscal variables of our focus. Second, we perform a survey among IMF country desks of its 192 country-members. Such methodology leads us to a final dataset containing information on the latest (as of November 2023) indexation practices for at least 115 and at most 175 economies, depending on the budget item analyzed.

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[25] Given these estimates, we can further try to interpret the effect of the indexation on inflation using the half-life measure. That measure is defined as the number of periods for which the effect of a unit shock to inflation remains above 0.5. For an AR(1) process, the half-life can be described by $h = ln(1/2) / ln($ Sum of AR coefficients$)$. Using this simple formula as an approximation, particularly given that the exact computation of the half-life is more complex for AR(p) processes (Dias and Marques, 2005), a 20 percent increase in share of indexed spending (which corresponds approximately to increasing the average degree of indexation observed in Asia and sub-Saharan economies to the average observed in European economies) is associated with an increase in half-life of inflation by around 1 month.

The main contribution of our work is the new global dataset created. Policymakers can use it to understand how public finances in different regions of the world and types of economies are currently indexed. Moreover, the dataset can also be used by researchers to understand better the effects of indexation on public finances, including by calibrating macroeconomic models that account for inflation indexation (see Ascari and Sbordone, 2014).

In terms of initial analyses, our data show that current practices on indexation vary considerably across economies. Indexation of income tax thresholds seems to be the least prevalent across the world, with the resulting bracket creep contributing to revenue growth. Among budget items, pensions are the most commonly indexed, followed by transfers to lower-income groups and public sector wages. Pension indexation has become less prevalent over time. And many economies have made it less generous to reduce the burden on the budget and safeguard the sustainability of pension systems across the world, which is consistent with the finding of OECD (2022a). Economies have moved from indexation to wages toward indexation to prices as nominal wage increases have tended to exceed price inflation in the past, reflecting productivity gains.[26]

Many economies further index their social assistance programs. Around half of advanced economies links adjustments in several of their benefits to inflation (OECD 2022c). By contrast, most economies do not index changes in public wages to inflation—a practice that has become less prevalent in recent decades, perhaps because of the lower level of inflation until recent years. But the pressure to index may return if high inflation persists (Suthaharan and Bleakley 2022).[27] For example, Austria has recently adopted partial automatic inflation adjustments for all brackets except the highest, and indexation of cash benefits from January 2023. Czech Republic, in turn, has introduced additional indexation of pensions in case of significant surges in inflation during the year, which will be in action starting from January 2024. Interestingly, the research also indicates some inconsistencies across budgetary items, with some economies that index social assistance programs to the price level not indexing their public wages (e.g., US, Canada, Australia).

Furthermore, in line with the prominence of indexation in AEs, we show through simple correlation analyses that indexation is associated with more effective and transparent governments. Resource-rich economies also appear to rely less on indexation than other economies. Secondly, our accounting exercise, which provides already an example of quantitative analyses for which the dataset could be used, suggests that indexation can have significant impacts on fiscal outcomes during episodes of inflation surprises. Thirdly, our final quantitative analysis indicates that economies with a higher share of public spending indexed to prices tend to also have stronger inflation persistence. This is particularly relevant for the current macroeconomic policy discussion, given the uncertainty among scholars and policymakers about how persistent the current inflationary episode may become.

In terms of policy messages, our data and analyses present some of the trade-offs of adopting indexation practices, particularly in times of acute inflation surprise, again like in the recent episode. When reviewing automatic or discretionary indexation going forward, policymakers need to decide which groups and programs to protect from income erosion while avoiding policies that make inflation more persistent. On one hand, indexation may be an important policy design tool to improve economic well-being and reduce poverty in the long run from social assistance programs aimed at addressing poverty and inequality (Collyer, Wimer, and Harris, 2022). On the other hand, policymakers should carefully assess the impact of public wage setting during periods of high inflation, including through indexation, on the setting of private wages (Abdallah, Coady, and

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[26] In 2022, such a strategy may have been costlier than predicted given that inflation rose faster than nominal wages (OECD 2022d).

[27] For public wages, their increases in most countries tend to be related to the political cycle rather than to indexation (Gaspar, Gupta, and Mulas-Granados 2017).

Jirasavetakul, 2023) and on the stickiness of inflation. Policymakers also need to consider potential effects of inflation on the structure of the tax system and thresholds.

Lastly, our analysis could be extended in several ways in future research. First, the dataset could be extended to vary over time—which would generate a panel setup of the data—and to include other important budget items. Second, several analyses could be performed with the data including, for example, understanding how indexation of budget items affect the cyclical response of fiscal policy to inflation in different economies (see, for example, Balasundharam and others, 2024), the long-term distributional implications of indexation, the causal relationship between indexation and sticky inflation etc. A deeper understanding of costs and benefits of indexation could be particularly useful if inflation becomes entrenched, and as more economies develop and strengthen their fiscal institutions.

Annex I: List of Economies and Indexation Practices

Economy	Group	Pension Benefits Indexation *0* - No Automatic Indexation *p* - Automatic Indexation to prices *w* - Automatic Indexation to wages *m* - Automatic Indexation to a combination of prices, wages etc.	Social Assistance Benefits Indexation *0* - No Automatic Indexation *p* - Indexation to prices *m* - Indexation to other variables	Wage Indexation *0* - No Automatic Indexation *p* - Automatic Indexation to prices *m* - Automatic Indexation to other variables	Personal Income Tax Threshold Indexation *No* - Ad hoc adjustment **Automatic adjustment** - By law *Unclear process* - De facto Regular adjustment but no law
Afghanistan	LIDC			0	Flat rate PIT
Albania	EME	p	0	p	No
Algeria	EME	0	0	0	
Andorra	AE	p	0		
Angola	EME	0	0	0	No
Antigua and Barbuda	EME	0			No PIT
Argentina	EME	m	m		Unclear process
Armenia	EME	0	.0	0	
Aruba	EME	0			No
Australia	AE	p	p	0	No
Austria	AE	p	p	0	Automatic Adjustment
Azerbaijan	EME	w	0		
Bahamas, The	EME	p	p		
Bahrain	EME	0			No PIT
Bangladesh	LIDC	0	0	0	No
Barbados	EME	p			No
Belarus	EME	w	m		
Belgium	AE	p	p	p	Unclear process
Belize	EME	0			
Benin	LIDC	0	0		
Bhutan	LIDC	p		0	No
Bolivia	LIDC	p	0	0	Flat rate PIT
Bosnia and Herzegovina	EME	m	m	0	Flat rate PIT
Botswana	EME	0	0	0	No
Brazil	EME	m	0	0	No
Brunei Darussalam	EME	0	0		No PIT
Bulgaria	EME	m	0	0	Flat rate PIT
Burkina Faso	LIDC	0	0	0	
Burundi	LIDC	0	0	0	No
Cabo Verde	EME	0	0		No

Country					
Cambodia	LIDC		0		No
Cameroon	LIDC	0	0	0	No
Canada	AE	p	p	0	Automatic adjustment
Central African Republic	LIDC	0			
Chad	LIDC	0	0	0	No
Chile	EME	p	0	0	Automatic adjustment
China	EME	m	p		No
Colombia	EME	m	p	0	Unclear process
Comoros	LIDC	0	0	0	No
Congo, Democratic Republic of	LIDC	0			No
Congo, Republic of	LIDC	0	0	0	No
Costa Rica	EME	m	p	m	Automatic adjustment
Côte d'Ivoire	LIDC	0	0	m	No
Croatia	EME	m	0	m	No
Cyprus	AE	p	p	p	No
Czech Republic	AE	m	0	0	No
Denmark	AE	w	m	0	Automatic adjustment
Djibouti	LIDC				No
Dominica	EME	p			No
Dominican Republic	EME	0	0	0	No
Ecuador	EME	p	0	0	Automatic adjustment
Egypt	EME	0		0	No
El Salvador	EME	0		0	No
Equatorial Guinea	EME	0			No
Estonia	AE	m	0	0	Flat rate PIT
Eswatini	EME	0	0	m	No
Ethiopia	LIDC	0	0	0	No
Fiji	EME		0		No
Finland	AE	m	p	0	Unclear process
France	AE	p	p	0	Unclear process
Gabon	EME	0	0	0	No
Gambia, The	LIDC	0			No
Georgia	EME	m	0	0	Flat rate PIT
Germany	AE	m	m	0	Unclear process
Ghana	LIDC	0	0	0	No
Greece	AE	m	p	0	No
Grenada	EME	0			
Guatemala	EME	0		0	No
Guinea	LIDC	0	0		No
Guinea-Bissau	LIDC	0	0	0	No
Guyana	EME	0	0		No
Haiti	LIDC	0			
Honduras	LIDC	0	0	0	Automatic adjustment
Hong Kong SAR	AE	p			No
Hungary	EME	m	0	0	Flat rate PIT
Iceland	AE	m	0	0	Automatic adjustment
India	EME	p	0	p	No
Indonesia	EME	0	0	0	No
Iran	EME	p	p		Unclear process

Iraq	EME				No
Ireland	AE	w	0	0	No
Israel	AE	p	p	m	Automatic adjustment
Italy	AE	p	p	0	No
Jamaica	EME	0	0		No
Japan	AE	m	0	0	No
Jordan	EME	m		0	No
Kazakhstan	EME	p	p		Flat rate PIT
Kenya	LIDC	0	0		No
Kiribati	LIDC	0	0		No
South Korea	AE	p	0	0	No
Kosovo	EME	0	0	0	No
Kuwait	EME	0		0	No PIT
Kyrgyz Republic	LIDC	0	0	0	Flat rate PIT
Lao P.D.R.	LIDC	w	m		No
Latvia	AE	m	0	0	No
Lebanon	EME			0	No
Lesotho	LIDC	w	0	0	No
Liberia	LIDC		0	0	No
Libya	EME	w	0		No
Lithuania	AE	m	0	0	Automatic adjustment
Luxembourg	AE	m	p	p	No
Macao, SAR	AE	m			No
Madagascar	LIDC	w	0	0	No
Malawi	LIDC	0		0	No
Malaysia	EME	0		0	No
Maldives	EME	0	0		No
Mali	LIDC	0	0	0	No
Malta	AE	m	m	p	No
Marshall Islands	EME	0			
Mauritania	LIDC	p	0	0	No
Mauritius	EME	p	p		No
Mexico	EME	p	0	p	Automatic adjustment
Micronesia	EME	0			
Moldova	LIDC	m	p	0	Flat rate PIT
Mongolia	LIDC	0	0	0	No
Montenegro, Rep. of	EME	m	m	m	No
Morocco	EME	0	0	0	No
Mozambique	LIDC	0			No
Myanmar	LIDC		0		No
Namibia	EME	0	0	0	No
Nepal	LIDC	0	0		No
Netherlands	AE	w	p	0	Automatic adjustment
New Zealand	AE	m	m	0	No
Nicaragua	LIDC	p			No
Niger	LIDC	0	0	0	No
Nigeria	LIDC	0		0	No
North Macedonia	EME				No
Norway	AE	w	p	0	Unclear process

Country	Class				
Oman	EME	0		m	No PIT
Pakistan	EME	0	0	0	No
Palau	EME	0			
Panama	EME	0			No
Papua New Guinea	LIDC	0			No
Paraguay	EME	p			Unclear process
Peru	EME	0		0	Automatic adjustment
Philippines	EME	m	0	m	No
Poland	EME	m	0	0	No
Portugal	AE	m	m	0	No
Qatar	EME	0	0	0	No PIT
Romania	EME	m	p		Flat rate PIT
Russia	EME	p	p	0	No
Rwanda	LIDC	0	0	0	No
Samoa	EME	0			No
San Marino	AE	p	p	0	No
São Tomé and Príncipe	LIDC	0	0	0	No
Saudi Arabia	EME			0	No PIT
Senegal	LIDC	0	0	0	No
Serbia	EME	m	p	m	Automatic adjustment
Seychelles	EME	p	p		No
Sierra Leone	LIDC	0			No
Singapore	AE	0		0	No
Slovak Republic	AE	p	0	m	Automatic Adjustment
Slovenia	AE	m	p	0	No
Solomon Islands	LIDC	0			No
Somalia	LIDC				
South Africa	EME	0	0	0	Unclear process
South Sudan	LIDC				No
Spain	AE	p	0	0	No
Sri Lanka	EME	0	0		No
St. Kitts and Nevis	EME	0			
St. Lucia	EME	p			No
St. Vincent and the Grenadines	EME	p			
Sudan	LIDC	p		0	No
Suriname	EME	0	0	0	No
Sweden	AE	m	0	0	Unclear process
Switzerland	AE	m	p/m	0	Unclear process
Syria	EME	0			No
Taiwan Province of China	AE	p	p		Automatic adjustment
Tajikistan	LIDC	p	p	0	No
Tanzania	LIDC	m	0	m	No
Thailand	EME	0	0		No
Timor-Leste	EME				No
Togo	LIDC	0	0		No
Tonga	EME				No
Trinidad and Tobago	EME	0			No
Tunisia	EME	w		p	No
Türkiye	EME	p	0	p	Unclear process

Turkmenistan	EME	w	w	0	Flat rate PIT
Uganda	LIDC	0	0	0	No
Ukraine	EME	m	m	p	Unclear process
United Arab Emirates	EME			0	No PIT
United Kingdom	AE	m	p	0	No
United States	AE	p	p	0	Automatic adjustment
Uruguay	EME	w	p	0	Unclear process
Uzbekistan	LIDC	p	w		Unclear process
Vanuatu	EME	0			No PIT
Venezuela	EME	w			Automatic adjustment
Vietnam	LIDC	m	0		No
West Bank and Gaza	EME			p	No
Yemen	LIDC			0	
Zambia	LIDC	w/0	0	0	No
Zimbabwe	LIDC	0	0	0	No

Note: For cases where indexation is mentioned as "p/m", part of the benefits is indexed to prices and some parts indexed to other variables.

Annex II: Main Data Sources

S. No.	Source	Link	Details/Notes
1	US Social Security Administration	https://www.ssa.gov/policy/docs/progdesc/ssptw/	The process involved reading through individual reports published throughout the years from 2002 to 2019 for each economy and extracting data on pension and social assistance benefits.
2	OECD Pension Policy Notes and Reviews	https://www.oecd.org/els/public-pensions/policy-notes-and-reviews.htm	Additional OECD resource referred: https://www.oecd-ilibrary.org/sites/79b569c0-en/index.html?itemId=/content/component/79b569c0-en
3	Mutual Information System on Social Protection	https://www.missoc.org/missoc-database/comparative-tables/	
4	International Social Security Association (ISSA)	https://ww1.issa.int/country-profiles	We investigated through each economy's profile to collect data/information on indexation practices of social assistance programs.
5	IBFD - Tax Research Platform	https://www.ibfd.org/	We referred to a previous IMF publication, "Tax Distortions from Inflation: What are They? How to Deal with Them?" by Beer, Griffiths and Klemm (2023) and utilized their dataset on PIT thresholds indexation. The original authors used the IBFD's Tax Research Platform to collect data.
6	IMF Pay Setting Systems Dataset	https://www.imf.org/en/Publications/Policy-Papers/Issues/2016/12/31/Managing-Government-Compensation-and-Employment-Institutions-Policies-and-Reform-Challenges-PP5044	We referred to the IMF's Pay Setting Systems dataset from 2016 as a starting point. We used this as a reference point to find updates and verified with the IMF country desks.

Annex III: Summary Statistics for the Accounting Exercise

	Inflation shock	Deflator shock	Wage Bill	Pensions	Social Spending
Average	5.75	3.64	5.95	6.84	2.09
Median	4.50	1.84	5.20	6.09	1.92
25th percentile	3.65	1.27	4.03	4.36	1.36
75th percentile	5.40	3.50	7.13	8.34	2.76
Number of observations	9	12	4	10	5

Annex IV: Weighted Indexation Values per Economy

Economy	Income Group	Weighted Indexation 2020	3-Year (2018–2020) Weighted Indexation Average
Italy	AE	0.56	0.49
Luxembourg	AE	0.53	0.47
Cyprus	AE	0.52	0.58
Belgium	AE	0.46	0.42
Turkey	EM	0.45	0.45
Mexico	EM	0.35	0.39
Moldova	LIDC	0.32	0.35
Belarus	EM	0.28	0.29
Finland	AE	0.27	0.19
France	AE	0.27	0.28
Switzerland	AE	0.26	0.27
Croatia	EM	0.24	0.27
Slovenia	AE	0.24	0.17
Slovak Republic	AE	0.23	0.24
Uzbekistan	EM	0.23	0.25
Serbia	EM	0.21	0.24
Lithuania	AE	0.21	0.15
Denmark	AE	0.20	0.14
Estonia	AE	0.20	0.14
Czech Republic	AE	0.20	0.21
Latvia	AE	0.19	0.14
United Kingdom	AE	0.17	0.20
Sweden	AE	0.16	0.11
Netherlands	AE	0.16	0.11
United States	AE	0.13	0.15
Mauritius	EM	0.12	0.10
Chile	EM	0.12	0.13
Canada	AE	0.10	0.13
Ecuador	EM	0.09	0.09
Israel	AE	0.09	0.10
Korea	AE	0.09	0.10
Hong Kong SAR	AE	0.07	0.10
Jordan	EM	--	0.20
El Salvador	EM	0	0
Kiribati	EM	0	0
Côte d'Ivoire	LIDC	0	0
Bulgaria	EM	0	0
Spain	AE	0	0
Seychelles	EM	0	0
Rwanda	LIDC	0	0
Myanmar	LIDC	0	0
Thailand	EM	0	0

Macao, SAR	AE	0	0
Cambodia	LIDC	0	0
United Arab Emirates	EM	0	0
Samoa	EM	0	0
Ukraine	EM	0	0
Albania	EM	0	0
Ireland	AE	0	0
Singapore	AE	0	0
Mongolia	LIDC	0	0
Senegal	LIDC	0	0
South Africa	EM	0	0
Armenia	EM	0	0
Namibia	EM	0	0
Austria	AE	0	0
Nepal	LIDC	0	0
Bosnia and Herzegovina	EM	0	0

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