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Interactions Between Public and Private Sector Wages and Inflation in Mongolia

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ABSTRACT: The substantial increase in public sector wages in Mongolia introduced in the 2023 supplementary budget has raised concerns about its potential spillover effects on private sector wages and subsequent inflationary pressures. Furthermore, both public and private sector wages have grown on average faster than labor productivity in Mongolia during 2000-2023 with substantial implications for inflation. This paper aims to empirically investigate the relationship between public sector wages, private sector wages, and inflation in Mongolia, utilizing a quarterly dataset spanning from 2000Q4 to 2023Q4. Employing a structural vector autoregression (SVAR) model, we analyze the dynamic interactions among these variables to uncover the causal relationships. The findings indicate that a shock to private sector wages exerts a stronger immediate impact on inflation, peaking within the first four quarters, while a shock to public sector wages manifests a delayed effect on inflation, peaking between the sixth and ninth quarters. Additionally, shocks to public sector wages have a small and short-lived effect on private sector wages, whereas shocks to private sector wages significantly influence public sector wages, suggesting that private sector has a more leading role in wage setting behavior. These results have important policy implications, highlighting the need for public wage policies that are closely aligned with productivity changes and can contribute to macroeconomic and price stability in Mongolia.

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WORKING PAPERS

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Contents

I. Introduction

Public sector wage policies can play a central role in shaping overall wage trends across all sectors in economies dominated by the state sector, and can lead to inflationary pressures, especially if misaligned with productivity. In Mongolia, the procyclical tendencies of public wage adjustments during periods of revenue windfalls – as evidenced in mid-2023 when public sector wages were hiked by 30-40 percent in the supplementary budget – may amplify macroeconomic volatility, underscoring the need for a more predictable framework for wage policy. Understanding the relationship between public sector wages, private sector wages, and inflation is therefore important for developing effective economic policies in Mongolia.

Mongolia's transition from a centrally planned system to a more market-oriented economy over the past several decades has brought about significant changes in the labor market, with notable differences in wage-setting mechanisms between the public and private sectors. The public sector is characterized by administratively determined wages, with wage-setting primarily done via annual budget allocations in a centralized fashion governed by the provisions in the Civil Service and Labor Laws. Public sector wage adjustments are made in a discretionary fashion and are often procyclical, influenced by revenue dynamics and electoral cycles. Centralized wage bargaining takes place through a Tripartite committee that includes representatives from the government, Trade Unions and Employers Association, particularly in sectors like education and healthcare which are largely in the public sector. Moreover, according to the principles laid out in the Civil Service Law of 2017, civil servant wages should be aligned with comparable positions in the private sector and the government can prepare a proposal to increase the salaries of civil servants if they fall 5 percent or more below their private sector counterparts. By contrast, the wage-setting mechanism in the private sector is more flexible, market-driven, and decentralized. The government sets a national minimum wage based on proposals from the National Committee on Labor and Social Partnership every two years, which serves as a legal floor for private sector wages and is largely complied with.[1] In addition to collective bargaining agreements, individual employment contracts can be used to negotiate specific wage terms, particularly for high-skilled or specialized workers. Overall, private sector employment (2/3 of total employment) is larger than public sector employment (1/3 of total employment). These differences are pivotal in understanding how wage adjustments in one sector can influence the other and, ultimately, how these adjustments impact inflation.

Previous studies on the relationship between public sector wages, private sector wages, and inflation have largely focused on developed economies, where institutional frameworks and economic conditions differ significantly from those in Mongolia. One of those differences is the role of the exchange rate, which tends to be larger in emerging economies. In the context of Mongolia, the influence of public sector wages on private sector wage dynamics and inflation has not been extensively explored. This paper attempts to fill this gap in the literature and provide empirical evidence that could inform policymakers and contribute to the broader understanding of wage-inflation dynamics in Mongolia. It contributes to the existing literature by providing additional empirical evidence from an emerging economy, thereby enriching the global understanding of wage-inflation dynamics.

To analyze the wage-inflation dynamics in Mongolia, we utilize a quarterly dataset covering public and private sector wages, inflation rates, and other relevant economic indicators (including the exchange rate) over the period from 2000Q4 to 2023Q4. Applying a structural vector autoregression (SVAR) model, the empirical

[1] The instances of non-compliance in the formal sector are rare and subject to a hefty penalty of MNT 5 mln (about USD 1,750).

results reveal a distinct relationship between wage shocks in both sectors and inflation. Shocks to both public and private sector wages significantly influence inflation, albeit with different temporal patterns. A shock to private sector wages exerts a stronger impact in the first four quarters following the shock, peaking with an elasticity of 0.6, whereas a shock to public sector wages shows a delayed impact, peaking between the sixth and ninth quarters with an elasticity of 0.6.[2] This differential timing could be related to the relatively smaller size of the public sector comprising the general government and SOEs (about 30 percent of total employment) compared to the private sector (about 50 percent of employment in the limited liability companies), suggesting a weaker initial transmission from public wage increases to the overall wage bill and aggregate demand compared to private wage increases. Additionally, a shock to public sector wages has a small and short-lived impact on private sector wages, while shocks to private sector wages have a stronger impact on public sector wages, with the effect peaking in the fourth quarter after the shock with an elasticity of 0.3. This suggests that the private sector has a more leading role in wage setting behavior and public sector catches up with private sector. The exchange rate does not amplify the impact of public wages on inflation due to foreign exchange interventions by the Bank of Mongolia to stabilize the exchange rate in response to shocks.

The findings of this study have important policy implications. They underscore the importance of transitioning to public wage policies that are closely aligned with productivity growth and can contribute to macroeconomic and price stability.

The remainder of the paper is structured as follows. Section II presents the literature review. Sections III describes the empirical methodology. Section IV presents the data. Section V summarizes the estimation results. Section VI concludes.

II. Literature Review

The relationship between public sector wages, private sector wages, and inflation has been extensively studied in the economic literature, especially for advanced economies. This review summarizes key findings and theories from various studies, highlighting the complex interactions among these variables.

Several studies explore the interaction between public and private sector wages, often focusing on the direction of wage spillovers and their implications for inflation:

- **Wage leadership hypothesis**. Wages in one sector can lead wages in another sector and eventually have a combined effect on inflation. Afonso and Gomes (2014) find that in the euro area, public sector wages tend to lead private sector wages. The influence varies by country, with stronger effects observed in countries with centralized wage bargaining systems. The causality appears to run predominantly from public to private sector wages rather than vice versa. For OECD countries, Giordano and others (2011) confirm that public sector wages often set the pace for private sector wages. They argue that this leadership can be attributed to the public sector's role in stabilizing employment and wages, especially during economic downturns.

- **Comparative wage growth hypothesis**. Some studies argue that comparative wage growth plays an important role. Melly and Timpe (2017) found that in Germany, public sector wage increases often serve as

[2] An elasticity of 0.6 means that a 10 percent increase in annual wages leads to a 6 percent higher annual rate of inflation. In simple terms, higher wages lead to higher inflation rate, but the increase in inflation rate is not as large as the wage increase.

a benchmark for private sector wages. This benchmarking effect is particularly strong during periods of economic stability, suggesting that private sector employers use public sector wage adjustments as a reference point. In Sweden, Holmlund (1993) observed similar patterns where public sector wage agreements significantly influenced private sector wage settlements, reinforcing the notion of the public sector as a wage leader.

The interaction between wages and inflation is another critical area of research, with studies examining how wage adjustments in both sectors affect inflationary pressures:

- **Cost-push inflation**. The traditional view is that wage increases can lead to cost-push inflation, particularly if these increases are not matched by productivity gains. Dornbusch and others (2010) explain that cost-push inflation can result from rising wages in any sector, but public sector wages are particularly influential due to the sector's size and the rigidity of its wage-setting mechanisms. This view is supported by studies like those of Folster and Henrekson (2001), who found that significant public sector wage increases can lead to inflationary pressures. This occurs because higher public sector wages increase overall demand in the economy without a corresponding increase in productivity, leading to higher prices.

- **Wage-price spiral**. Another channel is the increase in production costs due to higher wages, which translate into higher prices, with feedback effect back to wages. Lamo and others (2008) examined the wage-price spiral mechanism in the euro area, noting that public sector wages often respond to inflation, creating a feedback loop where wage increases contribute to inflation, which in turn prompts further wage hikes. Blanchard and Katz (1999) discuss how wage-price spirals can emerge in both public and private sectors, but public sector wages tend to have a more pronounced effect due to their less flexible nature and the political pressures often involved in wage setting.

Research also delves into the differences in wage-setting mechanisms between the public and private sectors and their implications for inflation transmission:

- **Institutional differences**. Lamo and Messina (2010) highlight that institutional frameworks and bargaining processes in the public sector often differ significantly from those in the private sector. These differences can lead to asymmetric wage adjustments and varying impacts on inflation. Public sector wages are typically more rigid and can be influenced by political considerations, while private sector wages are more responsive to market conditions. Gregory and Borland (1999) also find that public sector wages are more influenced by political considerations, which can lead to wage increases that are not aligned with productivity gains, thereby contributing to inflationary pressures. Abdallah and others (2023) compile a cross-country database of public and private wages and find that public sector workers earn around 10 percent more relative to comparable private sector workers on average, but this premium tends to be lower in advanced economies compared to emerging markets.

- **Wage rigidity**. Another perspective is offered by Devereux and Hart (2006), who found that public sector wage rigidity can lead to delayed adjustments to economic shocks, thereby affecting inflation dynamics differently compared to the more flexible private sector wages. Kahn (1997)’s work on wage rigidity supports these findings, showing that the public sector's wage-setting processes often result in less flexibility, which can contribute to persistent inflationary trends.

Empirical studies often provide insights into the policy implications of wage-setting in the public sector and its broader economic effects.

- **Fiscal policy and wage control**. OECD (2011) emphasizes the importance of fiscal discipline in managing public sector wages in OECD countries. Their recommendations include linking wage increases to productivity improvements and ensuring that wage-setting processes are transparent and based on economic realities. Abdallah and others (2023) find for a cross-section of advanced and emerging economies that both private wages and the price level respond positively to public wage shocks. The response is larger and more persistent in countries with higher unionization, higher bargaining coverage, and in more centralized wage bargaining regimes.

- **Country-specific analyses**. Country-specific studies, such as those focusing on developing economies, show varied impacts. For example, a study on India by ILO (2018) found that public sector wages, particularly for civil servants, saw significant increases following pay commission recommendations, which influenced wage trends in other sectors. Anderson and others (2014) examine the Baltic states and observe that public sector wage adjustments played a significant role in shaping inflationary trends. During periods of fiscal consolidation, controlling public sector wages helped stabilize inflation and restore economic balance.

Some papers have analyzed the relationship between wages and inflation in Mongolia. Barnett and others (2012) employ a VAR to analyze the relationship between public wage bill and core inflation in Mongolia. They find that government wage hikes push up core inflation, but the impact effect is small (elasticity of 0.05). Doojav (2009) also employs a VAR and finds a mutual Granger-causality between public wages and inflation. Impulse response functions suggest that a 1 percent shock to public wages leads to a 0.1 percent in inflation after a quarter, while a 1 percent shock to inflation leads to a 3.7 percent increase in wages in two quarters.

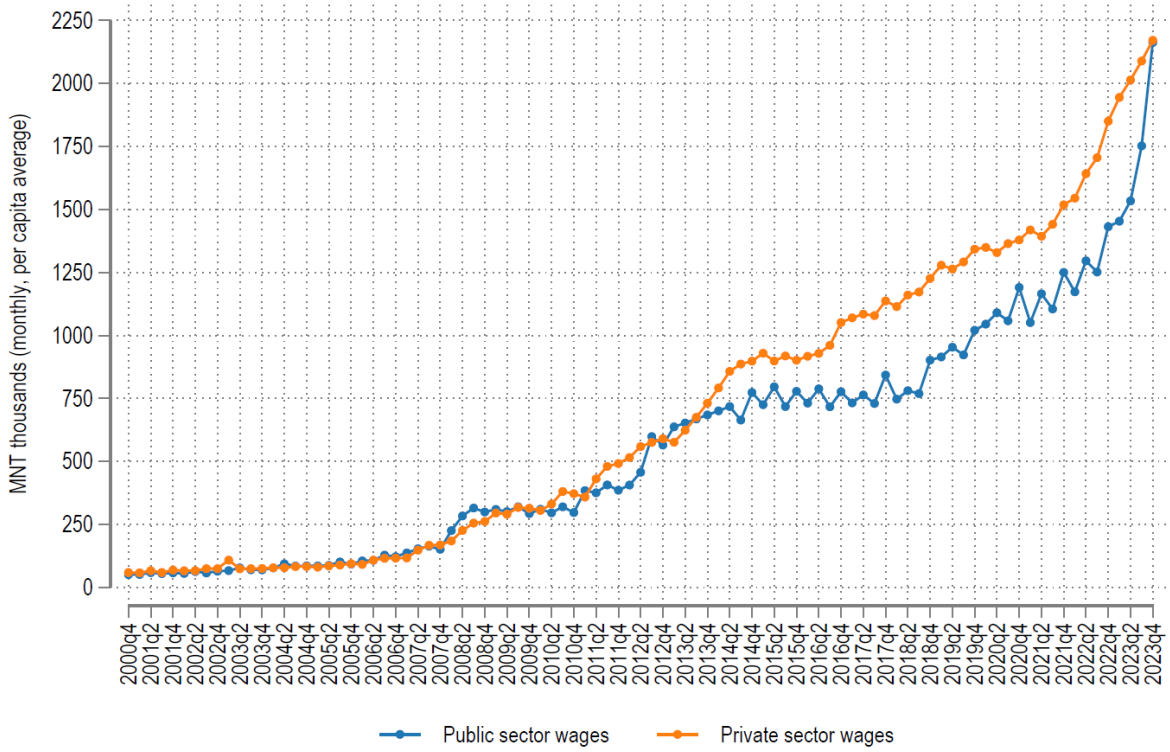
III. Data and Stylized Facts

We use the following endogenous variables: y-o-y growth in nominal public sector wages (*dlwg*), y-o-y growth in nominal private sector wages (*dlwp*), and CPI inflation (*dlp*).

Data on public and private sector wages is sourced from the National Statistical Office (NSO), which collects this information based on social security contributions made by employees. These figures represent average monthly wages per person, encompassing not only basic wages but also premiums and other supplementary payments.

Figure 1 illustrates the dynamics of private and public sector wages over time (in levels, per capita average). Until 2010, private and public sector wages were comparable. However, from 2011 onward, private sector wages began to exceed public sector wages. This divergence could be attributed to the expansion of job creation in the private sector following the country's largest foreign direct investment (FDI) in the Oyu Tolgoi mine and its first construction phase (Sayour and Schroder, 2021). In the second half of 2023, a significant increase in public wages as part of the supplementary budget led to a rise in public wages to levels comparable with those in the private sector.

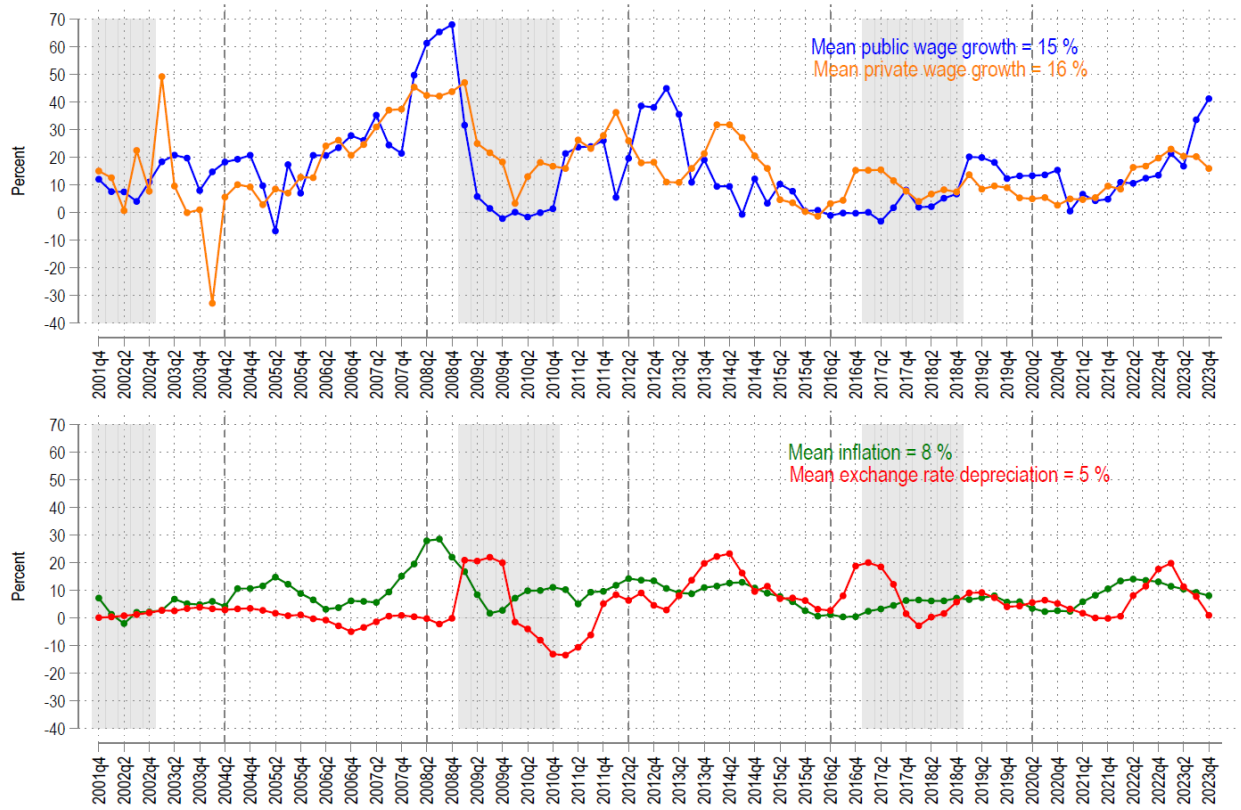
Figure 1. Public and Private Sector Wages



Source: NSO, IMF staff calculations.

Figure 2 presents the time series of the endogenous variables. Overall, public and private wages exhibit close co-movement. There is some evidence that public wages tend to rise in the lead-up to Parliamentary elections, while wage growth slows down during Fund-supported program periods. Inflation, on the other hand, is more persistent and is less volatile than wages, indicating that any transmission from wage shocks to inflation is likely to be delayed. Similarly, exchange rate fluctuations are less pronounced than wage dynamics, likely reflecting the Bank of Mongolia's foreign exchange interventions to stabilize the exchange rate in response to shocks that result in limited exchange rate flexibility. For most of the sample period, the growth rates of public and private sector wages surpassed the inflation rate, indicating real wage growth over the entire period. On average, public sector wages grew by 15 percent, private sector wages by 16 percent, while inflation averaged 8 percent. This suggests that the average real growth of public and private sector wages was approximately 7-8 percent from 2001 to 2022.

Figure 2. Changes in Public Wages, Private Wages, and CPI Index (y-o-y growth)



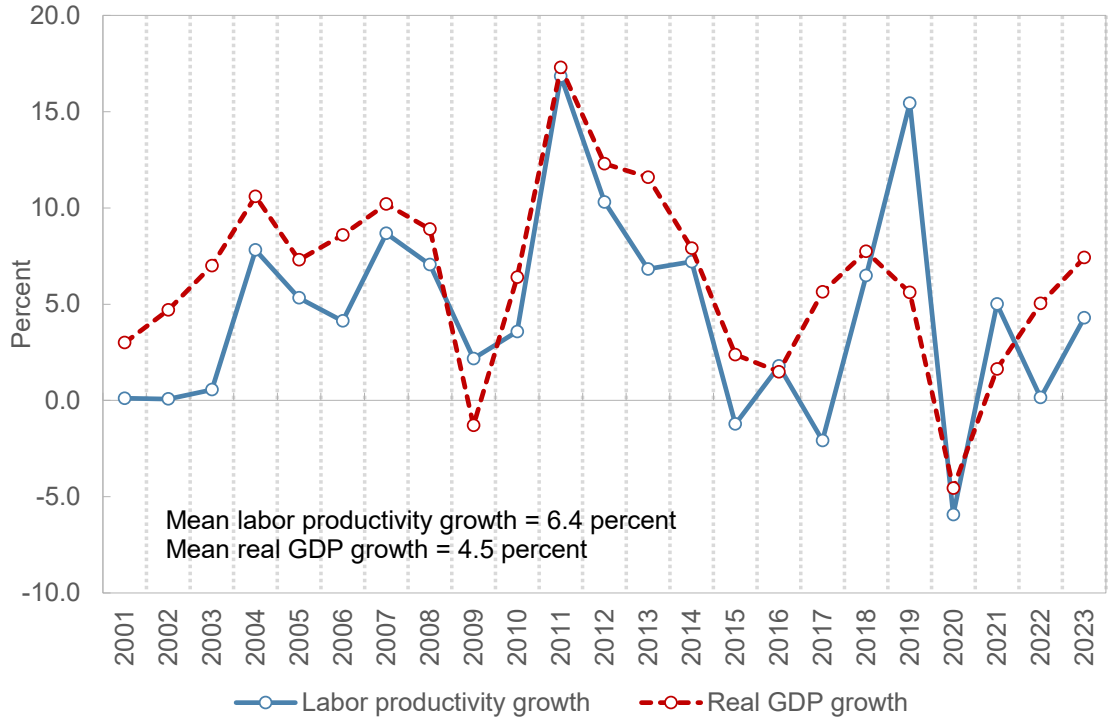
Source: NSO, IMF staff calculations.

Note: Grey areas indicate periods when Mongolia had a Fund-supported program in place and vertical lines indicate Parliamentary elections.

In the absence of disaggregated data on labor productivity and real GDP for the private and public sectors, in Figure 3 we present these indicators for the whole economy. The average labor productivity growth over this period was 6.4 percent, which is lower than the average real wage growth for the public (7 percent) and private (8 percent) sectors. This implies that the hikes in wages were on average inflationary, as they exceeded labor productivity.

It is also notable that the average labor productivity growth (6.4 percent) has exceeded the average real GDP growth (4.5 percent), which could be explained by large capital inflows, especially in the mining sector, which have increase capital intensity of labor and improved its productivity. Nevertheless, wage increases exceeded the increase in labor productivity, leading to inflationary pressures.

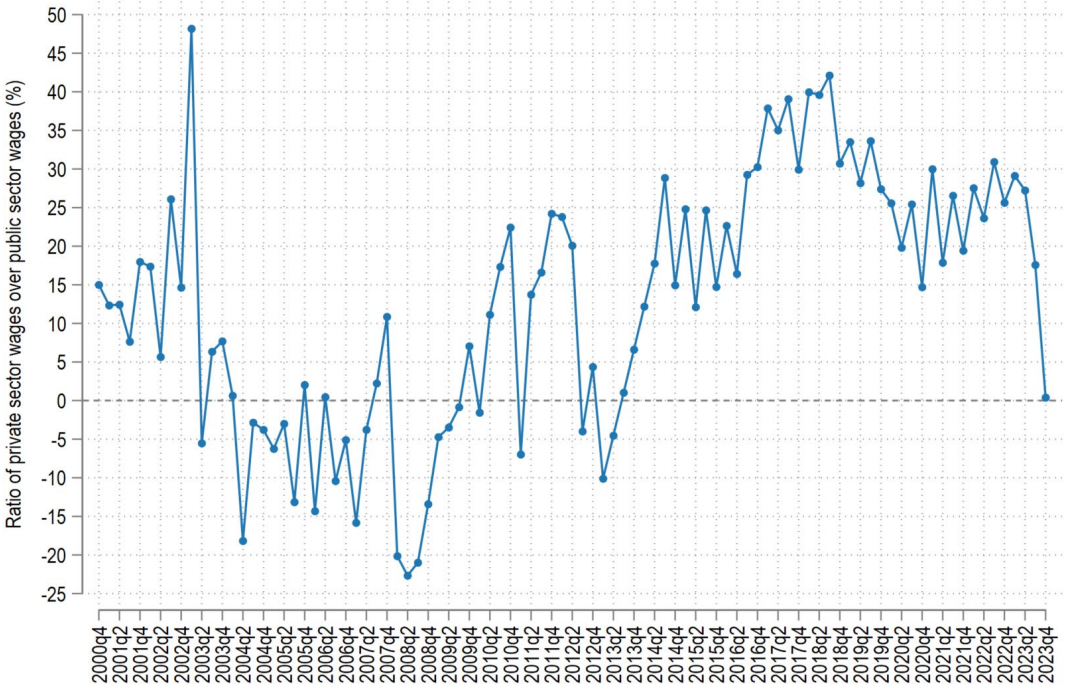
Figure 3. Labor Productivity and Real GDP Growth



Source: NSO, IMF staff calculations.

Note: Labor productivity is defined as the ratio of real GDP over employment.

Figure 4. Private Wage Premium over Public Wages



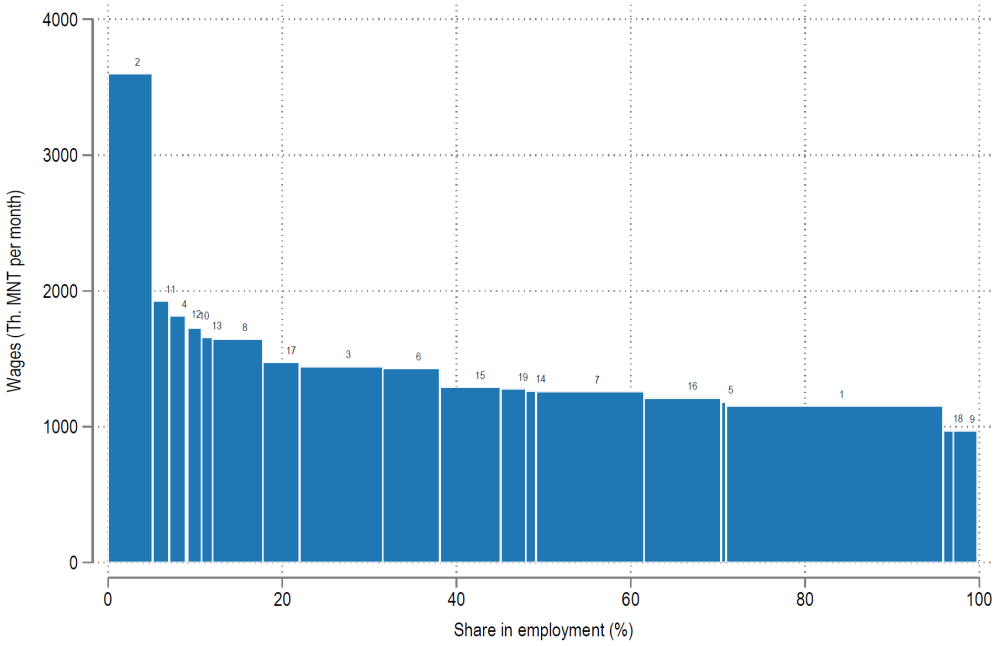
Source: NSO, IMF staff calculations.

Over time, one can observe a strong correlation between labor productivity and output growth (Figure 3). The jump in both indicators in 2011-12 coincides with the start of major foreign direct investments in the Oyu Tolgoi mine, which contributed to the above-mentioned divergence between private and public sector wages.

Analyzing the private wage premium – defined as the ratio of private sector wages to public sector wages – reveals a positive premium for most of the sample period (Figure 4). This premium can be partly explained by the fact that private sector jobs are in more productive sectors, resulting in higher pay. Another explanation could be related to the fact that public sector compensation comprises in-kind benefits (e.g., health insurance, educational and development opportunities, housing and transportation subsidies) to compensate for lower salaries relative to the private sector. The widening of the private wage premium in 2010s is linked to the above-mentioned foreign direct investments in the Oyu Tolgoi mine. In the second half of 2023, a significant increase in public sector wages, driven by the 2023 supplementary budget, eliminated the private wage premium of approximately 30 percent within two quarters.

Analyzing the sectoral breakdown of wage levels and employment shares (Figure 5) reveals notable heterogeneity. The mining sector offers the highest wage levels, averaging MNT 3.6 million per month, yet it represents a relatively small portion of total employment at just 5 percent. Conversely, the agricultural sector accounts for the largest share of total employment at 25 percent, despite offering the third-lowest salaries at MNT 1.1 million per month. Aside from the mining sector, wage differentiation among other sectors is not particularly pronounced.[3]

Figure 5. Sectoral Wages and Employment Shares (2022)



Source: NSO, IMF staff calculations.

Note: Definitions of sectors: 1 = agriculture, 2 = mining, 3 = manufacturing, 4 = electricity and gas, 5 = water, 6 = construction, 7 = trade, 8 = transport, 9 = accommodation, 10 = information and communication, 11 = finance, 12 = real estate, 13 = science, 14 = administrative services, 15 = public administration, 16 = education, 17 = health, 18 = art, and 19 = other services.

[3] Unfortunately, we do not have data on the sectoral composition of wages within public and private sectors.

To summarize, public and private sector wages generally exhibit close co-movement, albeit private wage premium has been positive in most of the sample, especially following the expansion of foreign direct investment in the mining sector in 2010s. Nominal wages fluctuate widely, often influenced by electoral cycles and Fund-supported programs; and average wage growth exceeded labor productivity growth, putting inflationary pressures. Nonetheless, inflation displays lower volatility compared to wages due to price stickiness. Similarly, exchange rate fluctuations were limited reflecting the Bank of Mongolia's foreign exchange interventions to stabilize the exchange rate in response to shocks. Building on these stylized facts, this paper analyzes the dynamic relationship among public sector wages, private sector wages, and inflation in Mongolia. The analysis focuses on understanding how wage adjustments in one sector influence the other and drive inflation. A central objective is to uncover the causal linkages between these variables and examine whether exchange rate fluctuations amplify these interactions. The analysis is particularly relevant in assessing the dynamic impact of the 30–40 percent public sector wage increase implemented in the 2023 supplementary budget on inflation. The results of the analysis would offer valuable policy implications.

IV. Methodology

We employ a structural vector autoregression (SVAR) model to analyze three endogenous variables: growth in public sector wages, growth in private sector wages, and CPI inflation in Mongolia.[4] We use a broader definition of public sector wages, that includes general government (28 percent of total number of employees) and SOEs (3 percent of total number of employees). As for private sector wages, we use limited liability company (LLC) wages, covering about 50 percent of the total number of employees. Our analysis utilizes quarterly data spanning from 2000Q4 to 2023Q4.

A reduced form VAR model takes the following form:

$$X_t = \mu_0 + A(L)X_{t-1} + EXOG + u_t \quad (1)$$

where μ_0 is a constant, X is a vector of endogenous variables, *EXOG* is a set of exogenous variables (changes in the nominal exchange rate up to 4th order lag to control for the exchange rate pass-through to inflation to account for the high share of imported goods in the CPI basket, seasonal dummies to control for residual seasonal effects in annual CPI growth rates), $A(L)$ is a 4th-order lag polynomial, u_t is a vector of reduced-form disturbances with mean zero. We use the following endogenous variables: y-o-y growth in nominal public sector wages (*dlwg*), y-o-y growth in nominal private sector wages (*dlwp*), annual CPI inflation (*dlp*).

The structural VAR model can be expressed as:

$$A_0X_t = A_0\mu_0 + A_0A(L)X_{t-1} + A_0EXOG + Be_t \quad (2)$$

where $Be_t = A_0u_t$ describes the relationship between the structural disturbances e_t (uncorrelated with each other) and the reduced-form disturbances u_t (correlated with each other).

[4] We have also run the analysis using log levels of endogenous variables and adding a time trend among exogenous controls. The results are qualitatively unchanged and available upon request.

To identify the structural model, we need to impose restrictions on matrices A_0 and B. We use the recursive Cholesky decomposition. The relationship between reduced form (u) and structural (e) disturbances can be written as:

$$\begin{bmatrix} -\alpha_{dlwg\_dlwg} & 0 & 0 \\ -\alpha_{dlwg\_dlwp} & -\alpha_{dlwp\_dlwp} & 0 \\ -\alpha_{dlwg\_dlp} & -\alpha_{dlwp\_dlp} & -\alpha_{dlp\_dlp} \end{bmatrix} \begin{bmatrix} u_t^{dlwg} \\ u_t^{dlwp} \\ u_t^{dlp} \end{bmatrix} = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} e_t^{dlwg} \\ e_t^{dlwp} \\ e_t^{dlp} \end{bmatrix} \quad (3)$$

This recursive ordering has the following interpretation: (i) public sector wages do not react contemporaneously to shocks in private sector wages and inflation within a quarter (since the budget cycle is typically annual)[5], (ii) growth in private sector wages reacts contemporaneously to changes in public sector wages, but does not react as contemporaneously to inflation, and (iii) inflation reacts contemporaneously to changes in public sector and private sector wages. We use this ordering as our baseline specification and check robustness of results to different orderings below.

V. Estimation Results

A. Diagnostic Tests

Before running the SVAR, we conducted several diagnostic tests to ensure the validity of our model. The Dickey-Fuller test confirmed the stationarity of all variables at the 10 percent confidence level. Lag order selection criteria indicated support for both 4 lags (FPE, AIC) and 2 lags (HQIC, SBIC); however, we selected the 4-lag specification to align with the quarterly data used in our analysis. The Lagrange multiplier test rejected the hypothesis of serial correlation of residuals, thereby validating the chosen specification. Additionally, all eigenvalues were found to lie within the unit circle, confirming the stability of the dynamic model. The Granger causality test supported the hypothesis that all three endogenous variables—public sector wages, private sector wages, and inflation—are causally influencing each other.

B. Impulse Response Functions

Below we present impulse response functions (IRFs) for 1 percentage point shock in each endogenous variable with some interpretation.

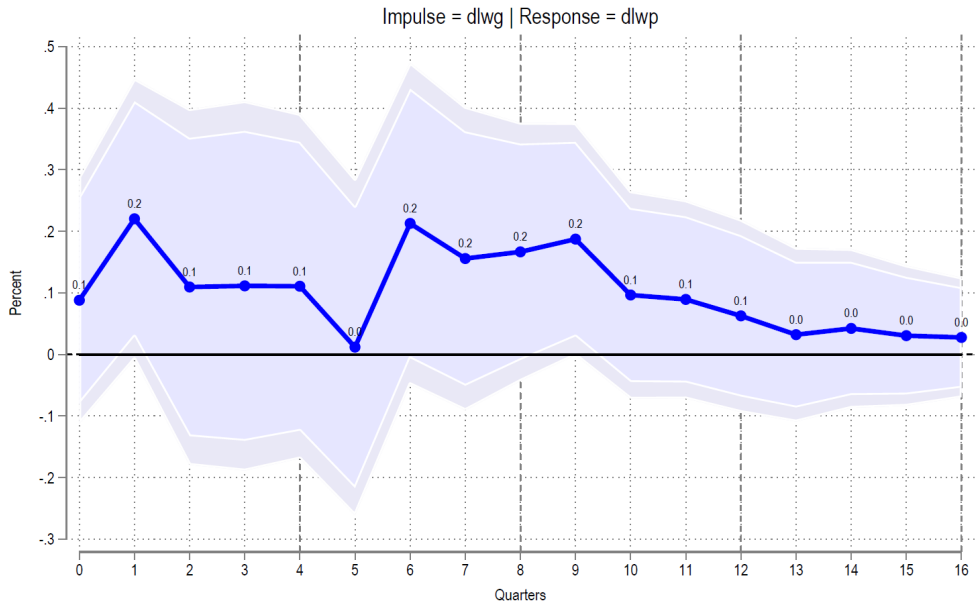
Figure (6) shows that a 1 percentage point shock to public sector wages leads to a 0.2 percentage points increase in private sector wages in the first quarter following the shock. The impact remains positive but turns mostly insignificant in outer quarters. Overall, the impact seems to be small and short-lived.

Figure (7) shows that a 1 percentage point shock to private sector wages leads to about 0.2-0.3 percentage points higher public sector wages in quarters 1-6. The impact remains positive but insignificant from quarter 7. Overall, these two positive IRFs imply that public and private sector wages grow interdependently, but public sector wages are somewhat more responsive to changes in private sector wages than the opposite. This suggests that private sector has a more leading role in wage setting behavior and public sector catches up with

[5] Although supplementary budgets have been approved in 19 years during this period, many of them were driven by austerity considerations rather than hikes in public wages.

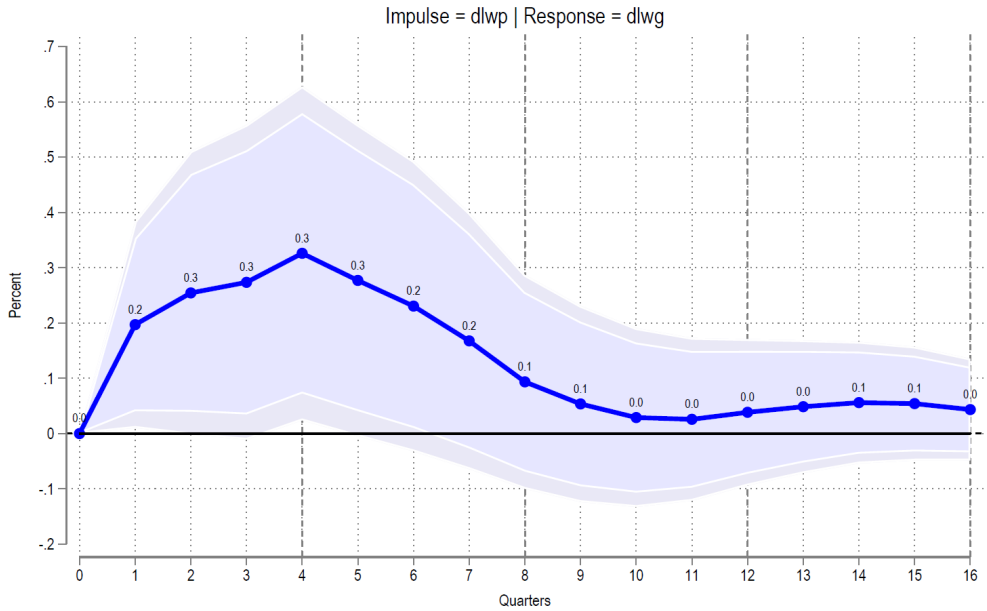
private sector to reduce the wage premium, which is consistent with the dynamics shown in Figures 2-3 especially after 2012.

Figure 6. Response of Private Sector Wages to a Shock in Public Sector Wages



Note: Reported are 90% and 95% confidence intervals using bootstrapped standard errors.

Figure 7. Response of Public Sector Wages to a Shock in Private Sector Wages

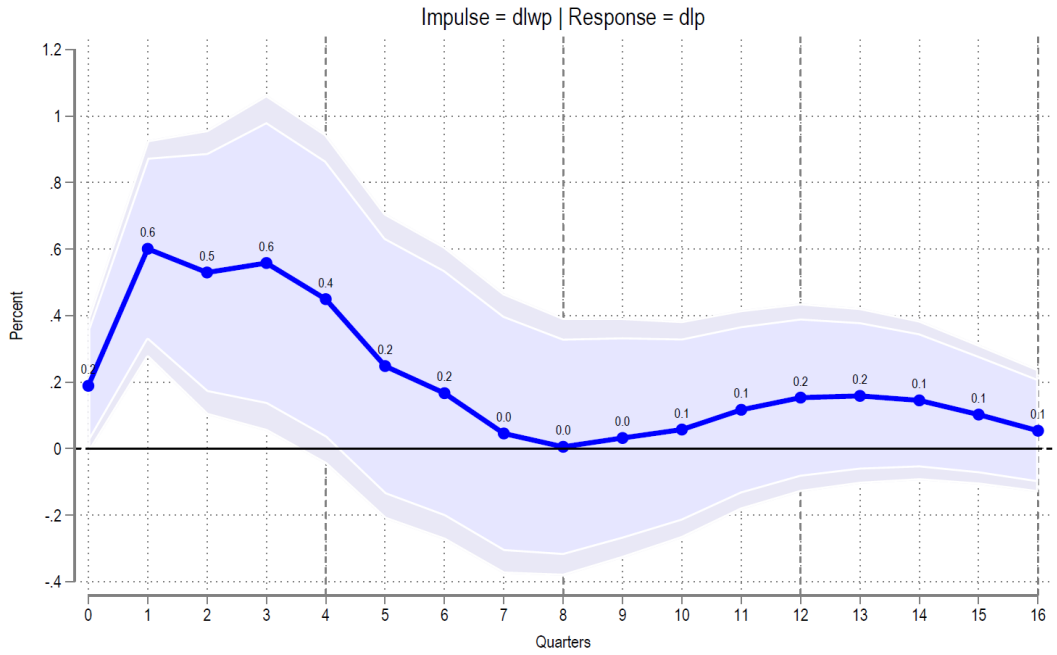


Note: Reported are 90% and 95% confidence intervals using bootstrapped standard errors.

Figure (8) illustrates that a 1 percentage point shock to private sector wages results in a 0.4 to 0.6 percentage point increase in inflation during the first year after the shock. This immediate impact on inflation can be attributed to the fact that private sector wages influence production costs, which are subsequently passed on to

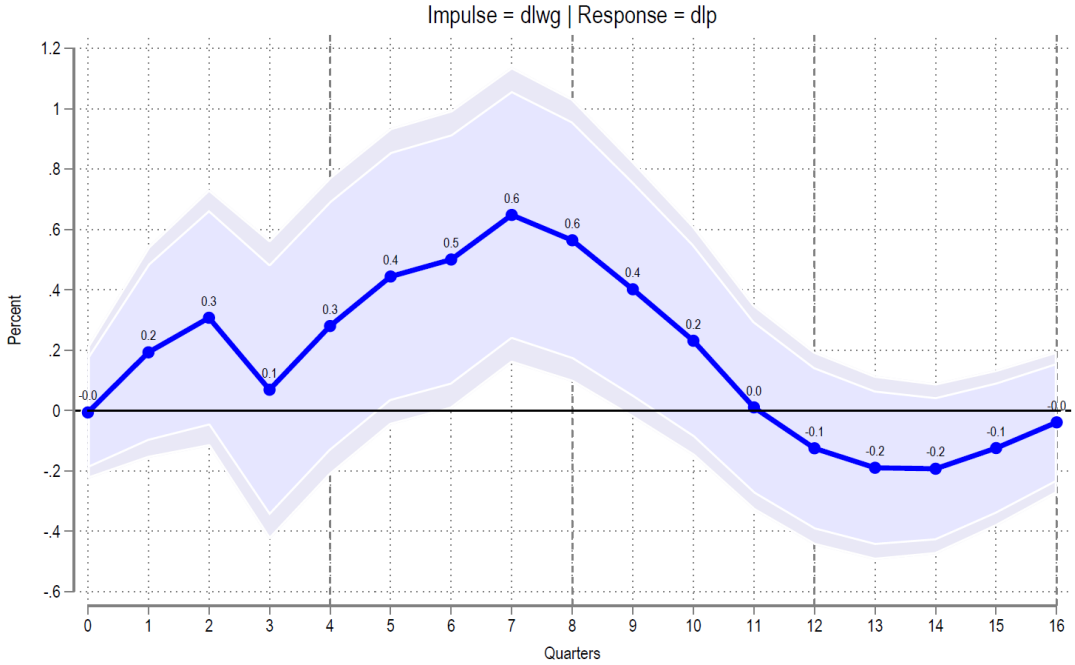
consumers through price adjustments. The effect diminishes and becomes statistically insignificant from the second year onward.

Figure 8. Response of Inflation to a Shock in Private Sector Wages



Note: Reported are 90% and 95% confidence intervals using bootstrapped standard errors.

Figure 9. Response of Inflation to a Shock in Public Sector Wages



Note: Reported are 90% and 95% confidence intervals using bootstrapped standard errors.

Figure (9) shows that a 1 percentage point shock to public sector wages leads to 0.4-0.6 percentage points higher inflation in the second year following the shock (quarters 5-8). Unlike the shock to private sector wages, here the impact is smaller and insignificant in the first year following the shock and the temporal pattern of the impact is more delayed. This could be explained by the relatively smaller size of the public sector (about 30 percent of total employment), which means that the 1 percent increase in public sector wages leads to a lower increase in the overall wage bill and aggregate demand compared to the 1 percent increase in private sector wages. Also, public sector wages in most cases do not affect the production costs directly and do not need to be passed on to consumers directly.

C. Variance Decomposition

Variance decomposition analysis provides insight into the relative importance of different shocks in explaining the variability of each endogenous variable in our SVAR. By decomposing the forecast error variance of each variable, we can quantify the contributions of public sector wage growth, private sector wage growth, and inflation shocks to the fluctuations in these variables over different time horizons.

We conducted variance decomposition for three endogenous variables – inflation, public wages and private wages (Figure 10). The decomposition was performed over several forecast horizons, from one quarter up to sixteen quarters, to observe both short-term and long-term effects. This analysis allows us to understand how much of the forecast error variance of each variable can be attributed to its own shocks versus shocks from the other variables.

- For CPI inflation, the variance decomposition reveals that inflation is primarily driven by its own shocks, with these shocks explaining roughly 80-97 percent of the variance in the first four quarters. In simple terms, most of variability in inflation seems to have a life of its own, largely shaped by patterns and shocks within inflation itself rather than wages. Shocks to private sector wages have a larger impact on CPI inflation than public sector wages, explaining about 20% of the variance in the first two years, with the influence peaking within the second year. The impact of public sector wage shocks on inflation is more delayed but still significant, contributing about 20% of the variance in the medium to long term (10-16 quarters).

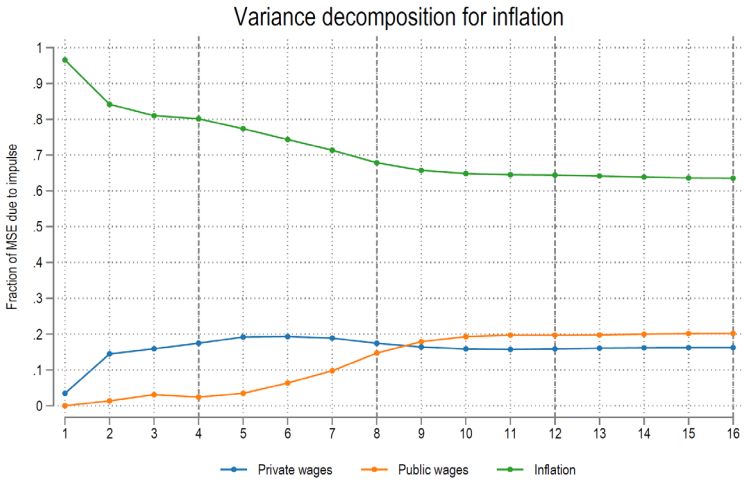
- For public wages, own shocks explain roughly 80-99 percent of the variance in the first four quarters. The contribution of shocks to private wages and inflation is comparable, explaining about 10-15% of the variance starting from the second year (quarters 5-16).

- For public wages, own shocks explain roughly 90-99 percent of the variance in the first four quarters. The contribution of shocks to public wages and inflation is smaller, explaining about 10% of the variance starting from the second year (quarters 5-16).

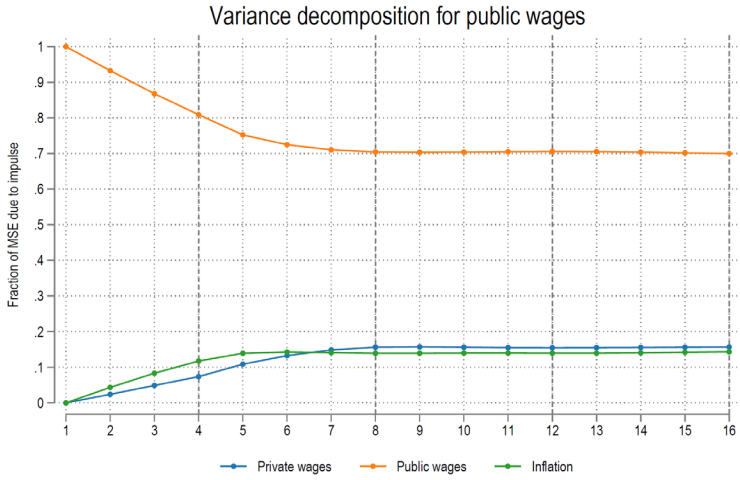
Overall, the results of the variance decomposition support the empirical findings on the asymmetric interdependency between public and private wages, as well as more delayed impact of public wages on inflation compared to the impact of private wages.

Figure 10. Variance Decomposition

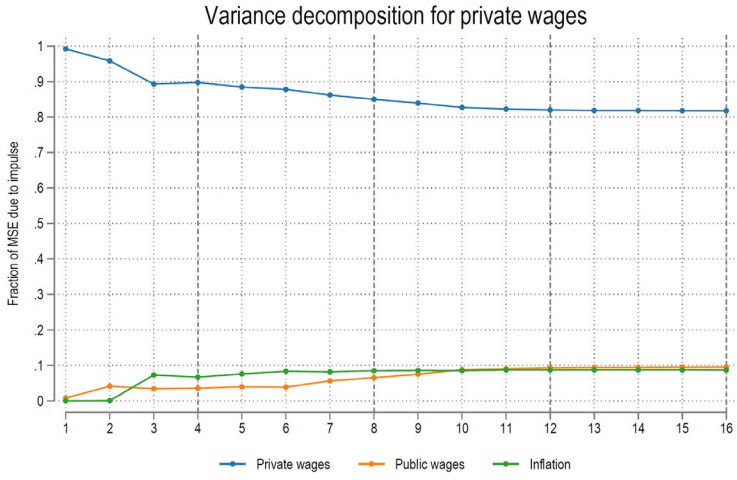
A. Inflation



B. Public wages



C. Private wages

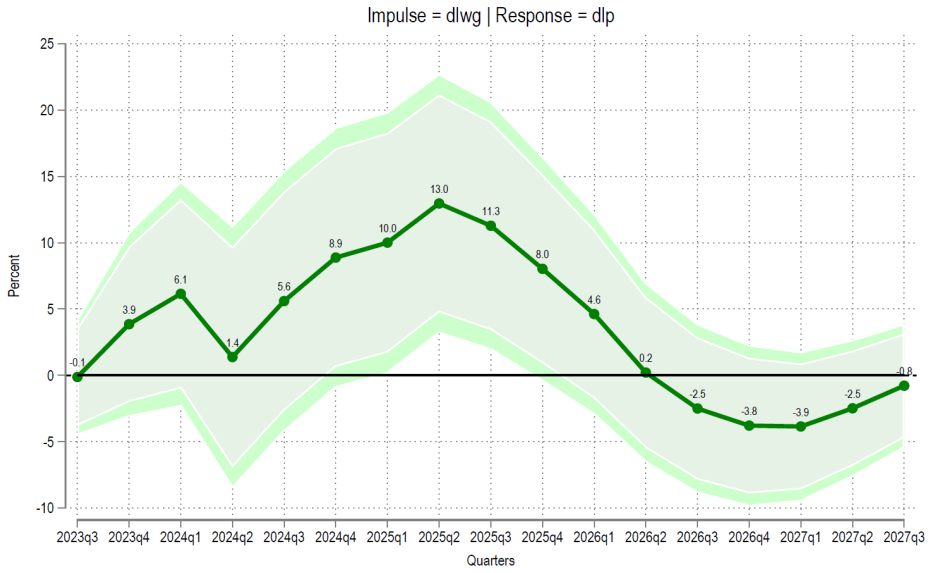


D. Public Sector Wage Hike in the 2023 Supplementary Budget: Quantitative Analysis

This section quantifies the impact of the increase in public wages in Mongolia's 2023 supplementary budget on inflation. The 2023 supplementary budget increased public wages permanently by 30-40 percent (35 percent on average) from July 2023 (2023Q3). This increase is 20 percentage points higher than average growth of public wages over 2001-2022 (15 percent). Therefore, we can infer that pay rise in the supplementary budget constitutes a 20 percent structural shock to public wages.

The IRF estimates to this shock are shown in Figure (11). The shock to public sector wages is projected to lead to inflationary pressures from 2025 onwards. At the peak, inflation is projected to be 13.0 percentage points higher in 2025Q2 compared to the no-public-wage-shock scenario. The impact dissipates and become insignificant from 2026 onward.

Figure 11. The Dynamic Effect of the Public Wage Hike in the 2023 Supplementary Budget on Inflation



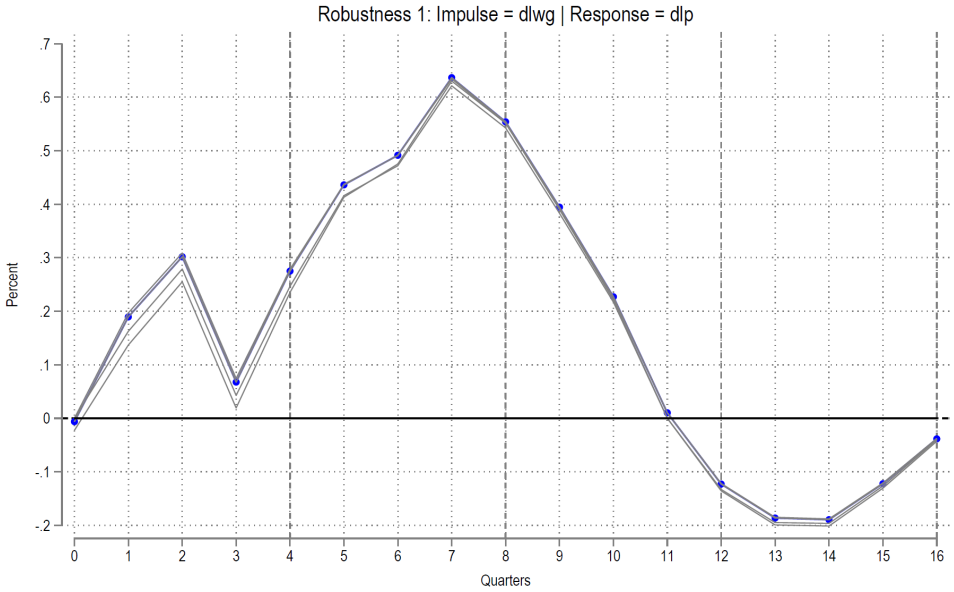
Note: Reported are 90% and 95% confidence intervals using bootstrapped standard errors.

VI. Robustness Checks

We conduct several robustness checks to assess validity of our estimations.

First, we alter the ordering of the endogenous variables. For an SVAR model with three endogenous variables, there are six possible orderings. Figure (12) displays the results, with the blue line and dots representing the baseline ordering, and the five grey lines representing the other possible orderings. As shown in the figure, all these orderings yield very similar results for the impulse response function (IRF) of inflation in response to a shock in public sector wages.

Figure 12. Robustness Check: Response of Inflation to a Shock in Public Sector Wages under Different Ordering of Endogenous Variables



Note: Reported are IRFs from estimates with six different orderings. The line with dots represents the IRF from the baseline model.

Next, we endogenize the exchange rate and include it in the model as the fourth endogenous variable. Out of 410 items in the CPI basket, 221 items are imported and account for 46 percent of the total weight. Therefore, exchange rate changes can have a large impact on inflation and transmission from public sector wages to inflation could be amplified through exchange rate changes. The ordering takes the following form: public wages (most exogenous) -> private wages -> exchange rate -> inflation (most endogenous). Figure (12) shows that the IRF remains qualitatively unchanged relative to the baseline IRF with exogenous exchange rate in Figure (9), suggesting that the exchange rate does not amplify the impact of public wages on inflation when it is endogenized. This could be explained by the Bank of Mongolia's foreign exchange interventions to stabilize the exchange rate, which mitigates the role of the exchange rate as an amplifier of public wage shocks.

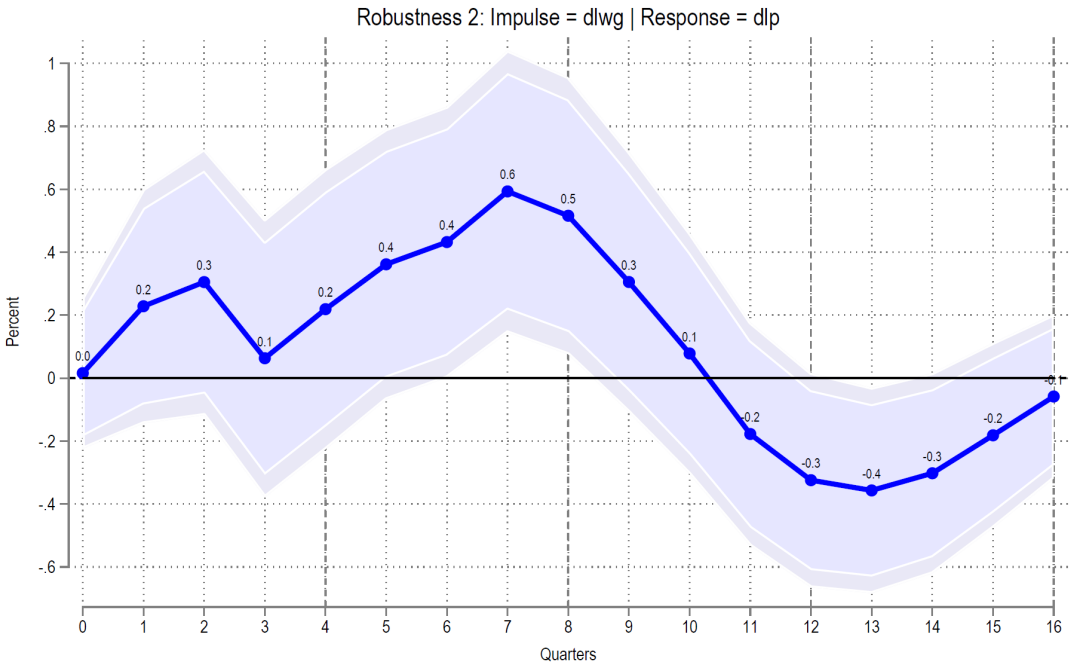
Furthermore, we include dummy variables to control for IMF programs (2001, 2009, 2017)[6], boom periods driven by commodity cycles and FDIs into Oyu Tolgoi (2004, 2007, 2011, 2018, 2022), crisis periods (2009, 2016, and 2020), and parliamentary elections (2000, 2004, 2008, 2012, 2016, 2020). Figure (14) shows that the IRF remains qualitatively unchanged after these additions, supporting the robustness of results.

We also conducted a series of robustness checks to confirm the reliability of our findings. These checks included incorporating dummy variables for years when the government increased minimum wages, adding other exogenous variables (such as prices of copper, coal, and oil, as well as money supply growth, GDP growth, and inflation in China), and using core inflation instead of headline inflation as one of the endogenous variables.[7] The results remain qualitatively unchanged and are available upon request.

[6] Mongolia has also received a financial support through IMF's Rapid Financing Instrument (RFI) in 2020 following the COVID pandemic. This support was extended without ex-post program-based conditionality on reviews but involved some prior commitments.

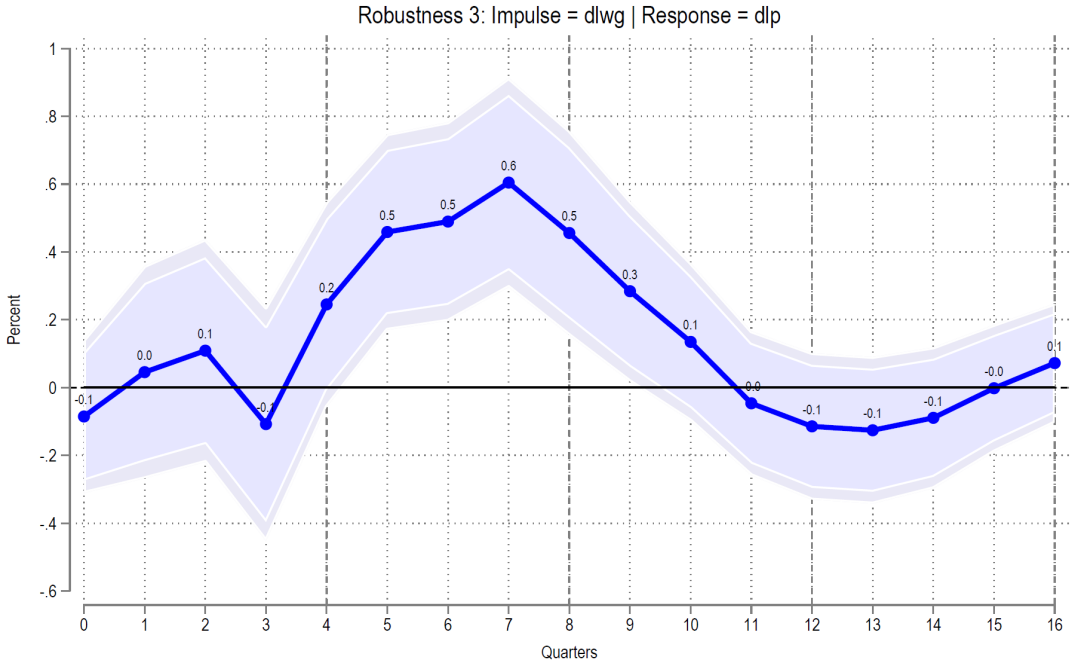
[7] The core inflation excludes from the headline inflation categories of goods that are subject to one-time, transitory, and supply-side shocks, such as vegetable, fuel, and government-regulated products, as reported in the Bank of Mongolia monthly statistical bulletin. Specifically, the core inflation excludes 59 goods and services, which constitute 24.7 percent of the consumption basket.

Figure 13. Robustness Check: Response of Inflation to a Shock in Public Sector Wages when Exchange Rate is Included as an Endogenous Variable



Note: Reported are 90% and 95% confidence intervals using bootstrapped standard errors.

Figure 14. Robustness Check: Response of Inflation to a Shock in Public Sector Wages when Including Controls for IMF Programs, Economic Booms, Parliamentary Elections, and Crisis Periods



Note: Reported are 90% and 95% confidence intervals using bootstrapped standard errors.

VII. Conclusions

This study provides an empirical analysis of the relationship between public sector wages, private sector wages, and inflation in Mongolia using quarterly data from 2000Q4 to 2023Q4. By employing a structural vector autoregression (SVAR) model, we were able to analyze the dynamic interactions and causal relationships among these variables, offering insights for policymakers.

Our findings reveal that shocks to public sector wages have a modest and short-lived effect on private sector wages, while shocks to private sector wages exert a more significant impact on public sector wages, with the influence peaking in the fourth quarter after the shock and an elasticity of 0.3. This indicates a notable sensitivity of public sector wage adjustments to changes in the private sector, reflecting potential spillover effects and interdependencies between the two sectors.

Furthermore, both public and private sector wage shocks have substantial effects on inflation, but with different temporal patterns. A shock to private sector wages produces a stronger immediate impact on inflation, with an elasticity of 0.6 peaking within the first four quarters. In contrast, a shock to public sector wages results in a delayed inflationary effect, peaking with an elasticity of 0.6 between the sixth and ninth quarters. This differential timing could be related to the relatively smaller size of the public sector (about 30 percent of total employment), suggesting a weaker initial transmission from public wage increases to the overall wage bill and aggregate demand compared to private wage increases.

The main implication is that the policymakers in Mongolia need to be mindful of inflationary implications of wage policies. The practice of discretionary and often procyclical adjustments in public sector wages in excess of labor productivity changes – particularly during election years or in times of revenue windfalls – warrants reconsideration. Aligning public wage increases with productivity growth is essential to mitigating inflationary pressures. In this context, the recent initiatives by the Mongolian government to introduce performance-based compensation for certain civil servants represents a positive step forward and should be effectively implemented. Additionally, it may be more prudent to focus spending on productivity enhancing expenditures to reduce volatility in wage dynamics; and enhance macroeconomic stability by ensuring a more predictable transmission from wage adjustments to inflation. This, in turn, would bolster monetary policy efforts to maintain price stability. Large wage increases of 30-40 percent should be avoided as it will lead to large wage-productivity gaps which can only be closed gradually over time as productivity gains take time to materialize.

To conclude, this study contributes to a deeper understanding of the intricate relationships between public sector wages, private sector wages, and inflation in Mongolia. By highlighting the causal links and dynamic interactions, our analysis provides a foundation for developing more effective public wage policies that can enhance economic stability and growth. Future research could build on these findings by exploring additional factors influencing these relationships, such as sector-specific productivity changes and gender bias, to further refine policy recommendations for Mongolia's evolving economy.

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