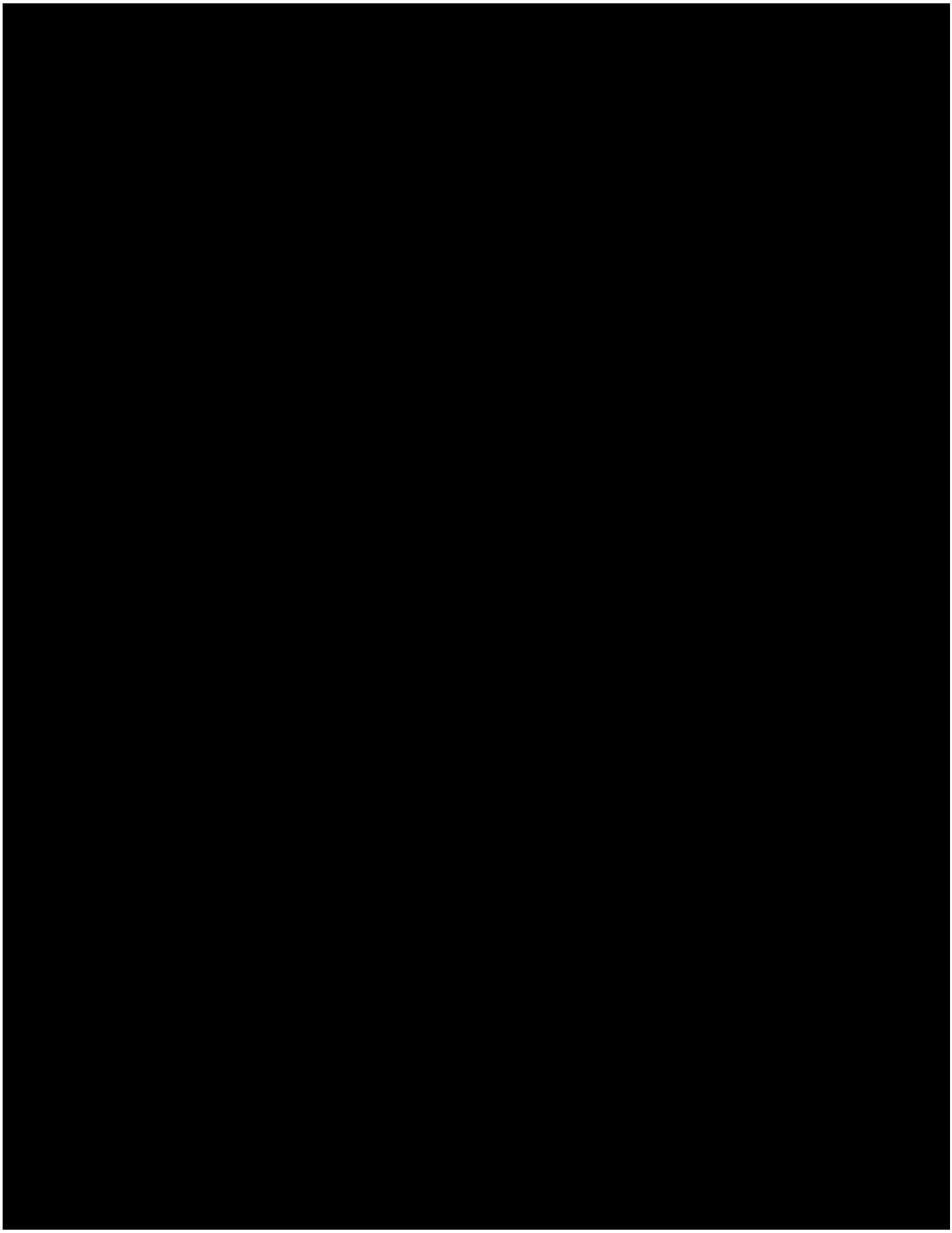

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Minimum Wage as a Wage Policy Tool in Japan

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Authorized for distribution by Luc Everaert

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Abstract

Using prefectural data, we study the potential impact on wage dynamics of the planned minimum wage increase policy in Japan. Our main result is that stepping up minimum wage growth from 2 to the planned 3 percent per year could raise wage growth by 0.5 percent annually. Given Japan's need for income policies to generate vigorous wage-price dynanics, reflecting the 2 percent inflation target, one policy implication of this finding is that, while the minimum wage plan will help boost wages, it should be accompanied by other, more "unorthodox" income policies, such as a "soft target" for private sector wage growth through a "comply -or-explain mechanism" for wage growth and increases in public wages in line with the inflation target.

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Contents **Page**

I. INTRODUCTION

Four years ago policy makers in Japan launched an ambitious policy framework (commonly referred to as Abenomics) based on monetary easing, flexible fiscal policy, and structural reforms to revive the economy and make a definitive escape from deflation. The most recent assessment of the Japanese economy by the IMF (2016) stresses that, while Abenomics met with initial success, its ambitious targets, including the two percent inflation target, will not be met under current policy. This is to a large extent due to a lack of nominal wage growth, a key factor preventing the positive wage-price dynamics that Japan needs to revive domestic demand and reach escape velocity from deflation. Despite the fact that Japan has maintained relatively strong productivity growth through the last two decades, wage growth has lagged behind, reflecting both entrenched deflationary expectations and structural characteristics of the labor market.

The case for a rise in nominal wages to break the deflationary cycle in Japan is not new. Everaert and Ganelli (2016) note that full time wages have increased a mere 0.3 percent since 1995, and call for substantial wage increases to be the "fourth arrow" of Abenomics. Aoyagi and Ganelli (2013) also stress that policies aimed at raising wages would facilitate acceptance of reform of employment protection, which in turn would help reducing duality in the labor market, thus boosting productivity. But why is wage growth so weak? Aoyagi and Ganelli (2013) argue that there is a "coordination problem", where companies and wage-setters seem to look backward in deciding on wage increases, i.e. they are reluctant to raise wages as they perceive deflation to be long-lasting.

Against this background, and in a renewed effort to revive the economy, the government has taken various initiatives aimed at promoting higher wages, including moral suasion under the tripartite commission and the public-private dialogue, and the announcement of substantial increases in the minimum wage. These initiatives are consistent with advice from the IMF (2016), which recommended that Abenomics should be "reloaded" through a policy upgrade package, including income policies to stimulate wage growth.

This paper empirically assesses the effectiveness of one of the policy tools included in the income policies toolkit, namely the plan announced by Prime Minister Abe under which the minimum wage is expected to be raised by 3 percent per year over the next few years, until it reaches 1,000 JPY per hour. Our main finding is that, while the increase in the minimum wage planned by the government can help stimulate average wage growth, the quantitative impact might fall short of the vigorous wage dynamics that Japan needs to escape deflation. This implies that the minimum wage increase should be complemented by other more "unorthodox" income policies, as we elaborate below.

To study the pass-through between the minimum wage and average wages, we employ a prefectural panel dataset of almost two decades (1997-2014) for men and women. This allows us to exploit the variability in Japan's prefectural data, and has the advantage of

capturing and contrasting gender-specific characteristics of the Japanese labor market. We make use of an Instrumental Variables regression to control for endogeneity in the data which may overestimate the pass-through effect. Our dependent variables are respectively the hourly average total wage, the hourly average male wage, and the hourly average female wage. We find that while an increase in the minimum wage will overall increase all wages, the increase is more pronounced on male wages. We also find that a one percent increase in the minimum wage could lead to about a 0.5 percent increase in total wages.

Accordingly, on the basis of our estimates the plan to step up minimum wage growth from 2 to the planned 3 percent per year could raise wage growth by an additional 0.5 percent annually. This would be a significant boost to wage growth, but it would still fall short of what is needed to engender the kind of wage-price dynamics that Japan needs to reach escape velocity from deflation. Given the Bank of Japan's inflation target of 2 percent, and assuming productivity growth of 1 percent, nominal wage growth of 3 percent would seem desirable for Japan. The policy implication of our analysis is therefore that, while the minimum wage increase policy announced by the authorities is helpful in stimulating wage growth, it should be complemented by other, more "unorthodox" income policies—e.g. a "soft target" through a "comply or explain mechanism" for wage growth; increases in public wages; stronger tax incentives or penalties as a last resort and possibly an additional wage bargaining round (see IMF 2016 for more details). As we discuss in more detail in the conclusions of this paper, such income policies would need to be complemented by tax reform to make sure that higher wages do not increase Japan's already excessive labor market duality by pushing more workers into non-regular jobs.

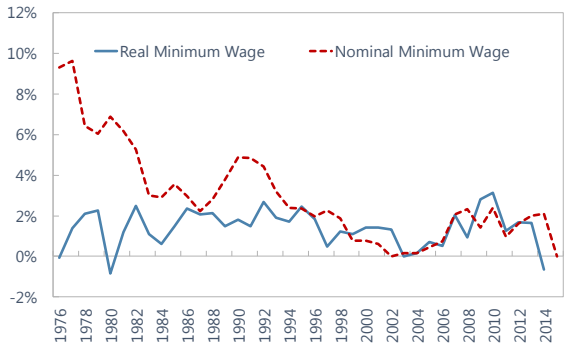
The rest of the paper is organized as follows. Section II presents stylized facts of the labor market in Japan. Section III discusses the relevant literature reviewed. Section IV discusses the empirical model used for the pass-through and the data used for the analysis. Section V presents the results. Section VI concludes.

II. STYLIZED FACTS

In September 2015, against a background of timid inflation and disappointing growth figures and in a new attempt to revive the economy, Prime Minister Abe announced his aim to increase Japan's nominal GDP by 20 percent to reach 600 trillion JPY by 2020. He later announced his policy to raise the national weighted average minimum wage by 3 percent on a yearly basis, which would result in a hike from 798 JPY to over 1,000 JPY per hour by fiscal year 2023. This seems an ambitious target in a historical perspective, as the minimum wage has not grown past 3 percent since 1994 and the nominal wage has also been below 3 percent since 1993. This weakness in real wage growth reflects in part an unwinding of previous real wage strength, as shown in the decline in Japan's labor share since the 1990s. However, in comparison with other advanced economies, Japan's labor share started from a relatively lower level in the mid-1990s and its decline over last two decades has been more

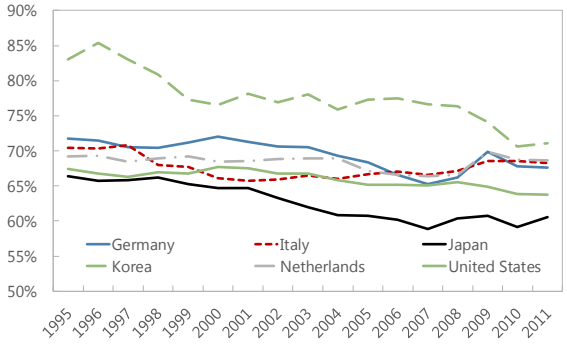
pronounced. The sharper declining trend in labor share in Japan is to a large extent driven by the comparative evolution of average wages and productivity.

Evolution of the Minimum Wage in Japan



Source : Japan's Ministry of Health, Labour and Welfare statistics.

Labour Income Share of Total Economy



Source: OECD database.

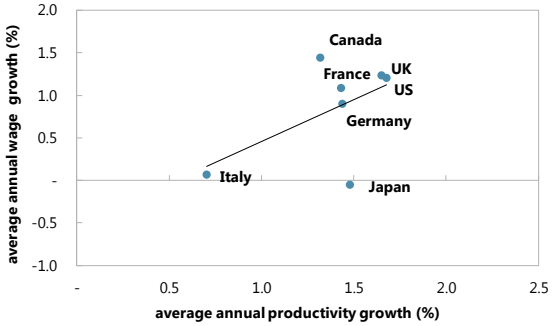
Japan experienced reasonably strong productivity growth in the early 90s and through the "lost decades", but this growth was accompanied by a zero (and sometimes negative) real wage growth. Of the other G7 countries, only Italy experienced a comparable degree of wage stagnation, but it was combined with weak productivity growth.

The Growth of Wages and Productivity

Sources : Haver Analytics, and Japan's Ministry of Health, Labour and Welfare statistics.

Real Wage and Productivity Growth

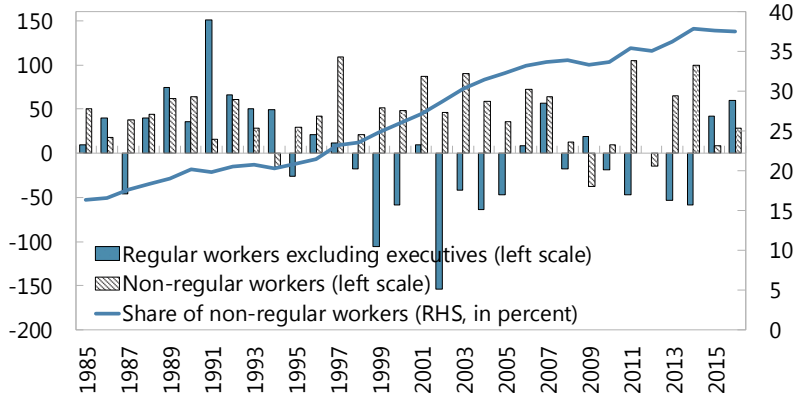
(Average 1992-2014)



Source:OECD, and IMF staff calculations.

Japan's excessive labor market duality is likely to have contributed in a significant way to its stagnant wage growth, as the share of non-regular workers rose gradually to reach almost 40 percent of total employees, and the share of part-time positions in new job openings reached 60 percent, putting downward pressure on average wage growth.

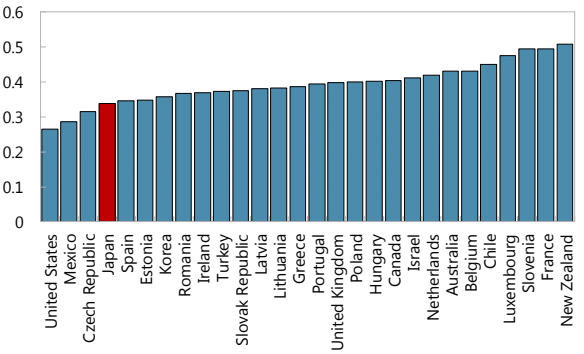
Share of Non-regular Workers 1/
(Annual employment change, Thousand persons)



Sources: Labor Force Survey (Ministry of Internal Affairs and Communications), and IMF staff calculations
1/ Feb.1985-2001, 2002-2015 Jan.-Mar. average.

On the other hand, Japan's minimum wage is relatively low. The minimum wage relative to average wages of full time workers ranks fourth lowest in the OECD (with only the U.S., Mexico and Czech Republic having lower minimum wages), suggesting that there is room to further raise it.

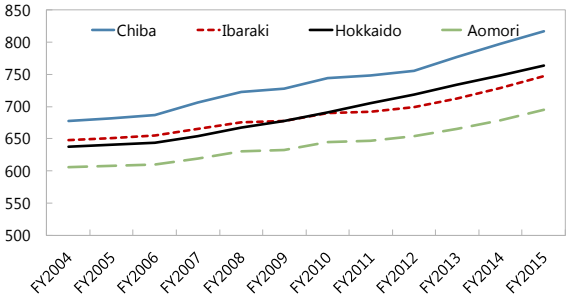
Minimum Relative to Average Wages of Full-time Workers
(2014)



Source: OECD Employment database.

Japan has a minimum wage system which, although set at the prefectural level, can be significantly influenced by the central government. The country's 47 prefectures are divided into four ranks depending on their relative economic position—from A being highest to D being lowest— and The Central Minimum Wage Council, an advisory body for the Ministry of Health, Labor and Welfare, sets guideline on prefectural minimum wage increases for each rank. Based on the panel's recommendations and taking local conditions into consideration, local councils decide on the actual minimum wage level for each prefecture. Although the recommendation by the central council is not legally binding, in practice it provides a lower bound. Implementation of the planned increases could be further ensured by strengthening the central government's role in setting the minimum wage. For the fiscal year 2016, the government advisory panel agreed to recommend raising the country's average minimum hourly wage by

Prefectural Minimum Wage
(selected prefectures 1/; yen)



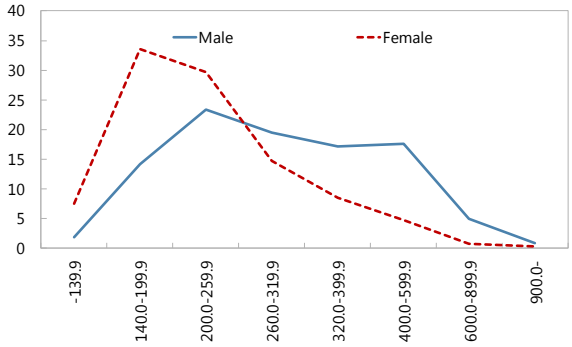
1/ Prefectures are selected from each rank as of 2015; Chiba (Rank A), Ibaraki (B), Hokkaido (C), Aomori(D)
Source: Ministry of Health, Labour and Welfare.

24 yen, or 3 percent, which was later incorporated into the decisions made by prefectures, so that the actual outcome was an increase slightly higher than the one recommended by the central government (25 yen to 823 yen per hour on average).

In 2014, the Japan Institute for Labor Policy (JILPT) estimated that 13.4 percent of total workers (4.7 percent of full-time workers and 39.2 percent of part-time workers) in Japan are earning a wage lower than "1.15 x prefectural minimum wage". Additionally, the Cabinet Office estimated that in 2014 the number of workers paid the minimum wage plus 20 yen was 3.4 million (about 6.5 percent of the working population), while the number of workers paid the minimum wage plus 40 yen was 5.1 million (almost 10 percent of the working population).

An estimate of the share of workers currently earning less than 1,000 JPY can also be made by looking at the distribution of wages for men and women. If we assume that full-time workers work 168.4 hours per month[2], we find that the workers who earn less than 179,900 yen per month (179,900/168.4 hours=1,068yen) are about 10 percent of total male full-time workers and about 29 percent of total female full-time workers. For part-time workers, the share of workers below the minimum wage (calculated as below 999 yen per hour) is about 54 percent for men and 66 percent for women.

Monthly Wage Distribution for Full-time Workers
(monthly wage in thousand yen; % of total number of workers)

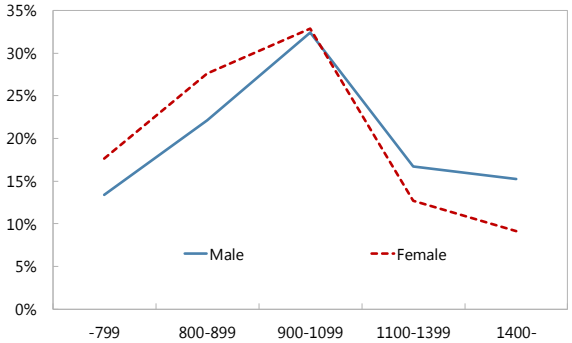


Sources: Ministry of Health Labor and Welfare; and IMF staff calculations.

The above estimates suggest that a large portion of the Japanese working population will be directly affected by the increase in the minimum wage.

Furthermore, the existing literature (see session III below) suggests that the effect of an increase in the minimum wage would go beyond the direct impact on workers whose earnings are around the minimum wage level, and that an increase in the minimum wage has spillover effects on the wage distribution. As the wages of the minimum-wage earners (who belong to a lower wage percentile) increase, this changes the total wage distribution, and may lead to changes in wages of the workers

Hourly Wage Distribution for Part-time Workers
(Hourly wage in yen; % of total number of workers)



Sources: Ministry of Health Labor and Welfare; and IMF Staff Calculations.

[2] 168.4 is the estimated average number of hours worked per month by full-time workers in 2014 by the Ministry of Health, Labor and Welfare monthly survey.

in other wage percentiles. Given this background, we believe that estimating the pass-through from the minimum wage to average wages is a relevant exercise.

III. LITERATURE REVIEW

The existing literature concerning minimum wages generally focuses on the impact of the former either on the wage distribution (in terms of spillovers or wage inequality) or employment.

The literature attributes the increase in overall wages due to a minimum wage increase to three potential effects. The first is a "truncation" effect: in a competitive market where workers are compensated for their marginal product of labor, an increase in the minimum wage will lead to loss of employment for all the workers who are paid less than the minimum wage, thus causing a truncation of the wage distribution below the new minimum wage. The second effect is referred to as a "spike" effect, by which if firms choose to retain the workers whose wages are below the minimum wage, their wages will be increased according to the minimum wage hike, causing the wage distribution density to spike around the minimum wage. The last effect is a spillover one: given that the minimum wage will raise the cost of minimum-wage earners, firms may choose to substitute them for more skilled workers. The increase in the demand for higher-skilled labor will subsequently raise their wages (Autor, Manning and Smith, 2010).

Wage distribution studies look at the "ripple "effects of a change in the minimum wage on earners at different levels of the wage distribution: if minimum wage earners are at the 10^{th} percentile wage earning percentile, studies show that workers in other percentiles (typically the 5^{th} or 20^{th} percentile) may be affected, depending on which factors come into play. Some of the most influential studies on the impact of the minimum wage on the wage distribution are the papers by DiNardo, Fortin and Lemieux (1996), Lee (1999), and Autor, Manning and Smith (2010). DiNardo, Fortin and Lemieux (1996) rely on the U.S. Current population survey's (CPS) data for a semi-parametric analysis of how the minimum wage changes affect the wage distribution and inequality. They find that, in the U.S., the decline of the real value of the minimum wage caused a substantial increase in wage inequality for women. Lee (1999) uses Ordinary Least Squares (OLS) on cross-state variation data to explore the effect of the fall of the federal minimum wage on inequality and earnings in the U.S. He finds that more than the total increase of wage differentials at the lower tail of the income distribution (50/10 ratio) was due to the decrease in the minimum wage.

Autor, Manning and Smith (2010) also investigate the impact of the minimum wage on earnings inequality in the U.S. They argue that Lee (1999)'s results are over-estimated due to bias in the data and propose to use Instrumental Variables (IV) instead of OLS to correct the sources of bias. They find that increasing the minimum wage reduces inequality in the lower tail of the wage distribution (by increasing the wages of the lower tail earners), but that usually the impact is very small for males. They also find that for the U.S., the effect of the

minimum wage extends to the wage percentiles where the minimum wage is not binding, implying spillovers to other percentiles.

Studies concerning the impact of the minimum wage on the Japanese labor market are scarce. A notable study is the paper by Kambayashi, Kawaguchi, and Yamada (2013) who use women's wage percentile data to assess the impact of a minimum wage increase in a deflationary period (between 1994 and 2003). They find that the minimum wage increase resulted in the reduction of inequality for women by the subsequent increase of their wages, and caused negligible employment losses.

Some studies also investigate the effects of a minimum wage increase on employment, given that a substitution effect may come into play as the minimum wage rises, where employers may choose to hire (now seemingly less costly) higher skilled workers instead of minimum wage earners. Neumark and Wascher (2004) use the CPS hourly and weekly wage data on rotation groups of people that show variations in the wage data. They argue that an increase of the minimum wage has negative employment effects on minimum wage earners, and has little positive effect on higher-wage earners. Gramlich (1976) suggests that a substitution effect may come into play as minimum-wage workers' wage increase, thus increasing the employment of higher-wage earners. Schmitt (2013) and Betcherman (2012) review recent research which suggest that there are little to no employment effects following a minimum wage increase.

Other researchers look into the impact of a minimum wage increase on part-time and full-time employment. Cunningham (1981) and Katz and Krueger (1992) find evidence suggesting that the minimum-wage hike may discourage part-time work and boost full-time employment, while Gramlich (1976) and Hungerford (2000) report that in some cases part-time work seems to increase, reducing full-time employment. These authors also find that high wage workers could be affected directly or indirectly by supply or demand shifts. Average wages might increase if the demand for higher-wage earners increases, as firms opt for employing full time (or more experienced) workers given that minimum wage earners have become more expensive. On the other hand, the labor supply of high-wage workers might increase as low-wage workers become unemployed or face less hours of work because of the minimum wage increases, leading to a decline in wages for high-skilled workers.[3]

Our main contribution to the literature is the following. We look at the pass-through of the real minimum wage on total wages, men's wages, and women's wages in Japan using an updated panel dataset from 1997 to 2014. We find that a 1 percent increase in the minimum

[3] Neumark and Wascher also suggest that results concerning the impact of the minimum wage vary regarding the period lag: research indicates that a significant portion of the minimum wage effect on employment occurs after a one-year lag. They also note that while immediate effects are usually positive, adverse effects can be seen in one year.

wage would increase average wages by 0.42 percent for women and by 0.66 percent for men, while total (for both men and women) average wages would increase by 0.48 percent.

IV. Empirical Strategy: Estimation of the Pass-Through of Minimum Wages to Average Wages in Japan

A. Data

The dataset employed in this paper includes prefectural level data from Japan's Ministry of Health, Labour and Welfare statistics, and covers seventeen years, from 1997 to 2014.

We run three separate regressions, in which the dependent variables are respectively average wage for men, women, and the total weighted average of men and women's wages.[4] For each regression, a vector Z of variables is included. In addition to the minimum wage (adjusted for inflation), we use the following variables: the unemployment rate, the consumer price index (CPI), prefectural real GDP, the share of part-time work applicants (which is our proxy of duality in the labor market),[5] the share of employment in manufacturing, and the average age of workers.[6]

Data on the wage percentiles on a prefectural level is not publicly available, which explains our choice of dependent variables. Wages for males, females and in total are monthly wages, reported on a yearly basis. They do not include bonuses, and they cover full-time workers only. In order to transform real wages from a monthly to an hourly measure, we divide them by the number of hours worked each month including overtime. Finally, we also adjust them for inflation. The minimum wage variable is the prefectural-level minimum wage, on an hourly rate. The minimum wage variable is also adjusted using the CPI index. Finally, while real GDP is the GDP of each prefecture, due to data availability the CPI index is the index for each major city in each prefecture, rather than the prefecture itself.

B. Empirical Estimation

Autor, Manning and Smith (2010) argue against using OLS. They identify two sources of bias in their data: first, they point out that fluctuations between the state wage median and other wage percentiles may be correlated. Secondly, they note that there may be a correlation between the trends in wages and the minimum wage, as they would fluctuate together and follow trends in the economy. They note (as well as Lee (1999)) that using fixed effects may worsen the bias: if there is an upward trend in wages, using fixed effects may strengthen this trend, and vice-versa if a downward trend exists. Despite the fact that we use real average

[4] For any given year t, the weighted average total wage is computed by summing together men's wages multiplied by the number of male workers and female wages multiplied by the number of female workers, and then dividing the sum by the total number of workers that year.

[5] We use the share of part-time new job applications to total new job applications as our proxy of duality because the share of part time workers to total workers is not available at the prefectural level.

wages instead of wage percentiles, we believe that endogeneity between minimum wages and average wages could very possibly exist, as minimum wages and average wages fluctuate together depending on trends in the economy. In addition to that, a key factor for policy-makers in setting the prefectural minimum wage is average wages in each prefecture, which may be another source of endogeneity in the data.

We regress log of hourly average real wage in each prefecture on the prefectural hourly real minimum wage and the control variables. We present our results using Ordinary Least Squares (OLS) and then Instrumental Variables, and find that OLS present a much higher coefficient for the pass-through between the minimum wage and average wages. Using a Durbin-Wu-Hausman test (augmented regression test), we confirm the existence of endogeneity between minimum wages and average wages**.** Therefore, we employ a two-stage least squares regression using the number of male and female applicants to social welfare as instruments.

We therefore follow the same strategy used by Autor, Manning and Smith (2010) and make use of an instrumental variables regression. When using instrumental variables in a regression, the instrument must satisfy the condition that it would lead to a change in the minimum wage variable without affecting the dependent variable (real wages), aside from indirectly via the minimum wage.

In Japan, minimum wages are established at a prefectural level, and take into consideration three factors: a) workers' cost of living, b) workers' wages, and c) the capacity of normal industries to pay wages (Japan's Labor Administration and Legislation). The first factor is measured by the access and demand for public assistance. In other words, in prefectures where the minimum standards of living are not met, there must be a higher amount of public assistance. As a response to that, minimum wages are adjusted accordingly, to help meet the standards of living of such prefecture. In that context, public welfare would have a direct impact on minimum wages but not on average earnings, which therefore makes a proxy for it a valid instrument for an instrumental variables regression. [7]

Given that there is no publicly available data for the amount of public welfare offered by each prefecture, we choose to use as instruments the number of male and female applicants to social welfare in each prefecture, divided by the total amount of social welfare applicants in Japan, to approximate which prefectures have the highest demand for public welfare. [8]

We now set up the model that examines the pass-through between average wages and the minimum wage. Let w_{it} denote the average wage in prefecture *i* in year *t*, mw_{it} the minimum

[7] The results of the standard tests for weak instruments (Stock, Wright and Yogo, 2002) as well as the over-identifications test (the Sargan, Basmann and Wooldridge tests) are shown in the appendix.

[8]Our data shows that the prefecture with the highest number of applicants for public welfare to population is Tokyo.

wage, and x_{it} the vector of control variables that expectedly affect wages. We therefore describe the relationship between the minimum-wage and total wages as follows:

$$\ln w_{it} = \beta_1 \ln mw_{it} + x_{it} + u_{it}$$

As mentioned above, the controls vector x_{it} includes the CPI index, GDP, the average age of workers, the unemployment rate, the duality proxy and the share of employment in manufacturing, and u_{it} represents the error term. Having established the presence of endogeneity in the data, we use 2SLS to determine the pass-through between real wages and the minimum wage.

V. RESULTS

The results of our Instrumental Variables estimation are reported in Table 1, and are supportive of the hypothesis that an increase in the minimum wage would help increase average wages in Japan. The regression suggests that a 1 percent increase in the hourly minimum wage could increase the hourly average wage by about 0.48 percent. Our results show that wages for men would increase by 0.66 percent as well, while women's wages would increase by 0.42 percent. This increase is statistically significant for both men and women. Table 2 reports the results from an OLS estimation, with the coefficients predictably overestimated.

Our results are also indicative of labor trends for the Japanese work-force, as our estimation reveals that women's average age is negatively correlated to their wages, while for men, their age has a positive impact on their wages. This reflects the traditional seniority wage system that in Japan, where workers' wages grow in accordance to the length of their period of work in a company instead of their productivity. In contrast, we see that women are left out from the seniority based pay increase, mainly because of the fact that many women drop out of the work force after bearing children and later restart working only as supplemental income earners in the household. Some of the factors behind this phenomenon include the tax deduction for spouses, which places an income cap on the second earner in a Japanese household (typically the woman). Other discouraging factors could be the lack of support with regards to childcare facilities to women when they are working.

The spousal tax deduction could also explain how minimum wage and duality measurement have different effects on male and female average wages. Female workers who choose to work full-time would not receive the spousal tax deduction, which is why most women choose to work part-time in Japan. While the spousal tax deduction system is not by itself gender discriminatory, in practice it is mostly women who adjust working hours to be eligible for the deduction. This reduces the supply of women for full-time labor, which explains why the labor duality is higher for female workers. In that context, men and women seem to transact in separate labor markets and thus average wages for men and women respond differently to some factors. With the minimum wage increasing, women may choose to lower their working hours in order not to pass the spousal tax deduction threshold, thus

causing a smaller change in the monthly wage distribution. This can explain why the pass-through of the minimum wage to men is higher than that to women, despite the fact that women make the majority of minimum wage workers.

In addition, the duality proxy, which is a measure of relative supply of part-time workers to full-time workers, is positive and significant for women. Intuitively, as this indicator increases, the full-time labor supply becomes relatively scarce, and thus pushes up the average wage of full-time workers in the female labor market. This explains why the duality proxy is positive for women, while the coefficient is negatively correlated to men's wages and wages in total (although these effects are not statistically significant).

Table 1: Wage Determinants in Japan (Prefectural Panel), Regression Results Using Instrumental Variables (hourly), in logs

Period: 1997-2014	Dep. Variable: **Real wages (total)**	Dep. Variable: **Real wages (Women)**	Dep. Variable: **Real wages (Men)**
Minimum Wage	0.48**	0.42**	0.66**
	(1.92)	(2.28)	(2.42)
CPI Inflation	-0.008**	-0.001	0.01**
	(-2.36)	(-0.31)	(02.31)
Prefectural GDP	0.0003 ***	0.0004***	0.0004***
	(4.33)	(6.20)	(5.09)
Share of part-time workers	-0.09	0.12**	-0.1
	(-0.99)	(1.65)	(-0.85)
Unemployment Rate	-0.009*	0.002	0.01*
	(-1.75)	(0.52)	(1.69)
Share of employment in manufacturing	0.002***	0.001*	0.003***
	(3.52)	(1.78)	(3.21)
Average female age	-0.03***	-0.02***	---
	(-6.22)	(-5.00)	
Average male age	0.04***	---	0.03***
	(5.28)		(4.27)
Constant	-2.41	-1.93	-6.23**
	(-1.30)	(-1.36)	(-3.14)
R-Squared	0.63	0.70	0.53

Source: IMF Staff Calculations
Z-statistics are reported in parenthesis. * denotes significance at 10% level, ** significance at 5% level, and *** significance at 1 percent level

Table 2. Wage Determinants in Japan (Prefectural Panel), Regression Results Using Ordinary Least Squares (hourly), in logs

Period: 1997-2014	Dep. Variable: **Real wages (total)**	Dep. Variable: **Real wages (Women)**	Dep. Variable: **Real wages (Men)**
Log Minimum Wage	1.05 ***	1.22***	1.06***
	(9.63)	(15.37)	(8.05)
CPI Inflation	-0.002	0.007***	0.01***
	(-0.87)	(3.96)	(4.27)
Prefectural GDP	0.0002 ***	0.0001***	0.0002***
	(3.73)	(4.23)	(6.24)
Share of Part-time Job Applications	-0.21***	-0.09**	-0.20**
	(-2.92)	(-1.77)	(-2.09)
Unemployment Rate	-0.008**	0.003	0.007
	(-1.71)	(0.77)	(1.44)
Share of Employment in Manufacturing	0.001**	-0.002	0.002**
	(2.56)	(-0.72)	(2.73)
Average female age	-0.02***	-0.01*	---
	(-5.80)	(-4.10)	
Average male age	0.03***	---	0.03***
	(4.78)		(5.64)
Constant	-6.61***	-8.03***	-9.12***
	(-7.61)	(-12.52)	(-8.87)
R-Squared	0.65	0.75	0.53

Source: IMF Staff Calculations
T-statistics are reported in parenthesis. * denotes significance at 10% level, ** significance at 5% level, and *** significance at 1 percent level

VI. CONCLUSION

In this paper we evaluate the potential impact of Japan's planned minimum wage increase on average wages. Our econometric results indicate that the pass-through of a one percent increase in the minimum wage would translate into about a 0.5 percent increase on wage in total. Gender specific regressions suggest an increase of 0.42 percent in the average wages of women, versus a 0.66 percent increase in the average wages of men.

The planned minimum wage increase in Japan has already been put in motion. In July 2016, a government advisory panel agreed to a 3 percent increase for the next year, a step up from the 2 percent it advised in previous years. Accordingly, our estimations suggest that this policy would expected to result in an additional 0.5 percent increase in average wages. This increase in average wages resulting from the minimum wage policy would be a significant boost to wage growth, but it would still fall short of what is needed to engender the kind of wage-price dynamics that Japan needs to reach escape velocity form deflation. Given the Bank of Japan's inflation target of 2 percent, and assuming productivity growth of 1 percent,

wage growth of 3 percent would seem desirable for Japan. The policy implication of our analysis is therefore that, while the minimum wage increase policy announced by the authorities is helpful in stimulating wage growth, it should be complemented by other income policies—e.g. a "soft target" for wage growth and increases in public wages. Furthermore, implementation of the planned increases could be further ensured by strengthening the central government's role in setting the minimum wage.

Another important issue to take into account when evaluating the impact of the minimum wage policy, and of income policies more in general, is related to complementarity with other reforms, such as tax policy. In Japan, part-timers account for the majority of non-regular workers, and they are mostly women. One of the factors behind the high female share of part-time workers is the tax deduction for spouses, which is a tax advantage that goes to married couples when one of them (usually the wife) earns less than 1.03 million yen. Also, from October 2016, previously exempt workers will be required to pay into the national health insurance and pension programs if they meet certain conditions, such as working at least 20 hours a week at a company with 501 or more employees and earning at least 1.06 million yen a year. The tax and social security system is therefore encouraging many married women to limit paid work, and the government is currently examining how to eliminate this tax advantage to mobilize more female labor force in regular jobs.

Despite efforts in this directions, such as subsidies to employers which split social insurance contributions with employees (conditional on increasing work hours and wages for their part-time employees) anecdotal evidence suggests that many part-time workers chose to reduce working hours in order to avoid hitting the new threshold. There is therefore a risk that, even if income policies are successful, in the absences of tax and social security reform, the attendant increase in wages might end up encouraging non-regular work. This underscores the importance of eliminating tax and social security distortions at the same time as income policies are implemented.

APPENDIX: TESTING FOR INSTRUMENTS VALIDITY AND SIGNIFICANCE

1. Average Total Wages Regression:

Table A.1. First-Stage Regression Results

Variable	R-squared	Adjusted R-sq	Partial R-Sq	F (2,365)	Prob > F
Real Minimum Wage (in log)	0.7478	0.7409	0.2027	30.9384	0.0000

Critical Values H_o: Instruments are weak	Number of Endogenous regressors: 1 Number of Excluded instruments: 3			
2SLS relative bias	5%	10%	20%	30%
	13.91	9.08	9.54	5.39
2SLS Size of nominal 5% Wald Test	10%	15%	20%	25%
	22.30	12.83	9.54	7.80

The F-statistic is 30.94, which exceeds Stock, Wright and Yogo's (2002) recommended F-statistic value for inference (F=10) for a 2SLS estimator to be reliable.

Furthermore, our test statistic exceeds the critical values for the "2SLS relative bias test" at 5%, 10%, 20% and 30% (30.94 > 13.9), as well as the "2SLS Size of nominal 5% Wald Test" at the 10%, 15%, 20% and 25% levels (30.93>22.30). We can therefore conclude that our instruments satisfy Stock and Yogo (2005)'s two conditions for an instrument to not be weak.

Table A.2. Test of Over-Identifying restrictions

Test of Over-Identifying Restrictions	Value	Significance (p-value)
Sargan (score) chi2(1)	= 7.3	p= 0.0069
Basmann chi2(1)	= 7.24	p= 0.0071
Wooldridge (score) chi2(2)	=8.25	p = 0.0161

Based on the Wooldridge score test, we do not reject the null hypothesis that our instruments are valid at the 1% significance level, though we reject the null hypothesis that our instruments are valid at the 5% significance level.

2. Average Male Wages Regression:

Table A.3. First-Stage Regression Results

Variable	R-squared	Adjusted R-sq	Partial R-Sq	F (2,365)	Prob > F
Real Minimum Wage (in log)	0.7445	0.7382	0.2375	37.9969	0.0000

Critical Values H_o: Instruments are weak	Number of Endogenous regressors: 1 Number of Excluded instruments: 3			
2SLS relative bias	5%	10%	20%	30%
	13.91	9.08	6.46	5.39
2SLS Size of nominal 5% Wald Test	10%	15%	20%	25%
	22.30	12.83	9.54	7.80

The F-statistic is equal to 37.99, and thus passes Stock Wright and Yogo's (2002) recommended F-statistic value for inference (F=10) for a 2SLS estimator to be reliable, as well as the tests for 2SLS relative bias, and the 2SLS Size of nominal 5% Wald Test

Table A.4. Test of Over-Identifying Restrictions

Test of Over-Identifying Restrictions	Value	Significance (p-value)
Sargan (score) chi2(2)	= 4.36	p= 0.1131
Basmann chi2(1)	= 4.293	p= 00.1169
Wooldridge (score) chi2(2)	=5.00398	p = 0.0819

Based on the Sargan and Basmann score tests, we do not reject the null hypothesis that our instruments are valid at the 1%, 5% and 10% significance level, though with the Wooldridge test score we reject the null hypothesis that our instruments are valid at the 10% significance level.

3. Average Female Wages Regression:

Table A.5. First-Stage Regression Results

Variable	R-squared	Adjusted R-sq	Partial R-Sq	F (2,366)	Prob > F
Real Minimum Wage (in log)	0.7477	0.7415	0.2320	36.8583	0.0000

Critical Values H_o: Instruments are weak	Number of Endogenous regressors: 1 Number of Excluded instruments: 3			
2SLS relative bias	5%	10%	20%	30%
	13.91	9.08	6.46	5.39
2SLS Size of nominal 5% Wald Test	10%	15%	20%	25%
	22.30	12.83	9.54	7.80

The F-statistic is equal to 36.85, and thus passes Stock Wright and Yogo's (2002) recommended F-statistic value for inference (F=10) for a 2SLS estimator to be reliable, as well as the tests for 2SLS relative bias, and the 2SLS Size of nominal 5% Wald Test

Table A.6. Test of Over-Identifying Restrictions

Test of Over-Identifying Restrictions	Value	Significance (p-value)
Sargan (score) chi2(2)	= 0.85916	p= 0.6508
Basmann chi2(1)	= 0.83225	p= 0.6576
Wooldridge (score) chi2(2)	=0.897377	p = 0.6385

Based on the Sargan, Basmann, and Wooldridge score tests, we do not reject the null hypothesis that our instruments are valid at the 1%, 5% and 10% significance level.

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