

Wage rigidities in Colombia: Measurement, causes, and policy implications

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Wage rigidities in Colombia: Measurement, causes, and policy implications

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1. Introduction

I. OBJECTIVE

- To estimate the extent of Downward Real Wage Rigidity (DRWR) in Colombia (2002-2014).
- To identify what are the main driving forces of DRWR.

II. MOTIVATION

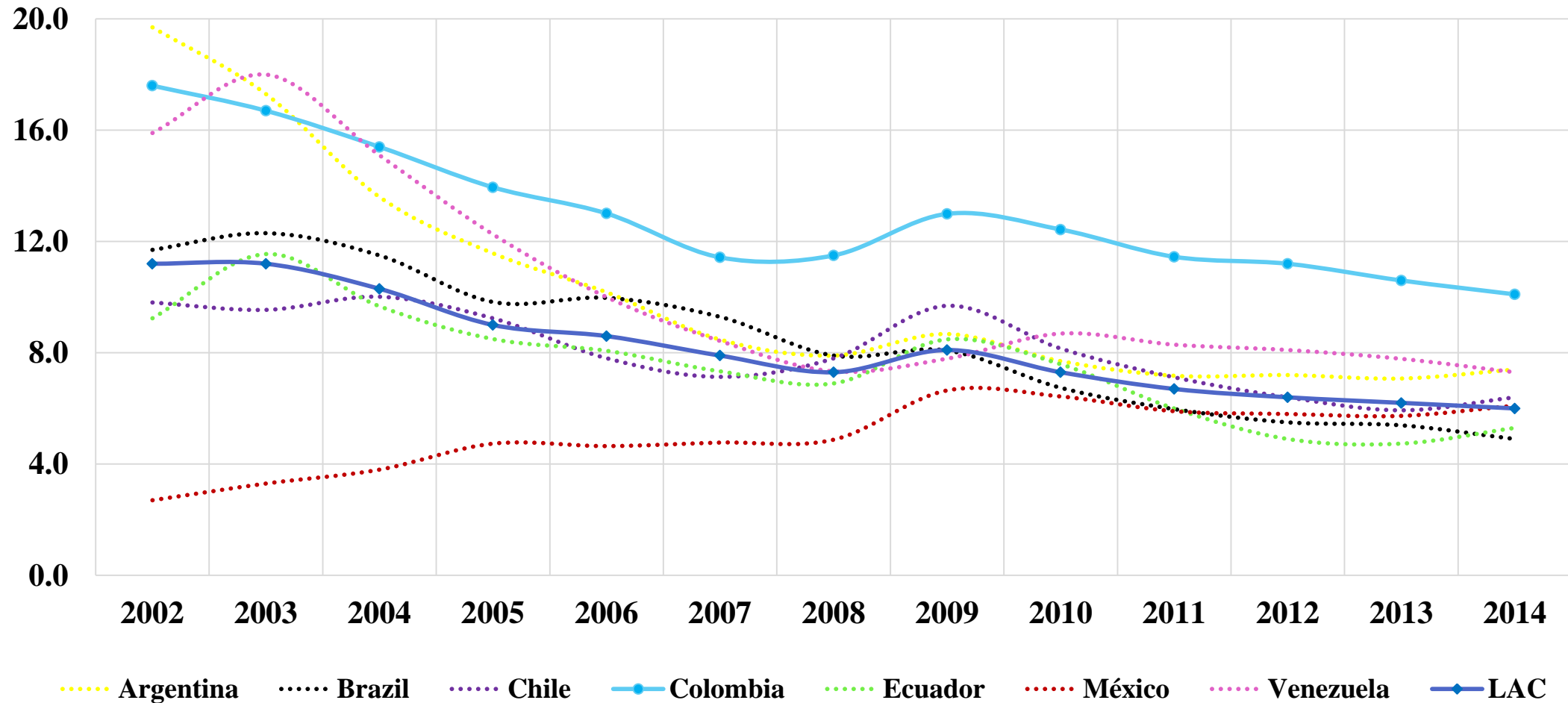
Colombia is considered to be one of the successful Latin American economies.

- Its growth rate since 2000 has been relatively stable around 5% on average, at the same time that inflation has been consistently reduced to stabilize at 3%. **In this context, unemployment persists and remains stubbornly high above 12%.**

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1. Introduction

Unemployment in Latin America and the Caribbean



Source: CEPAL

II. MOTIVATION

- Why this persistence?

Although common wisdom has implicitly assumed that wages are rigid, **no empirical evidence is provided in the literature.**

- How are connected wage rigidities to monetary policy issues?

Common wisdom states that wage rigidities become progressively important in slumps (this dates back to Tobin, 1972; who was the first one to claim that inflation is helpful to prevent negative effects of wage rigidities on unemployment).

1. Introduction

2. The extent of DRWR

- Theoretical model
- Data and empirical approach
- Results

3. Drivers of DRWR

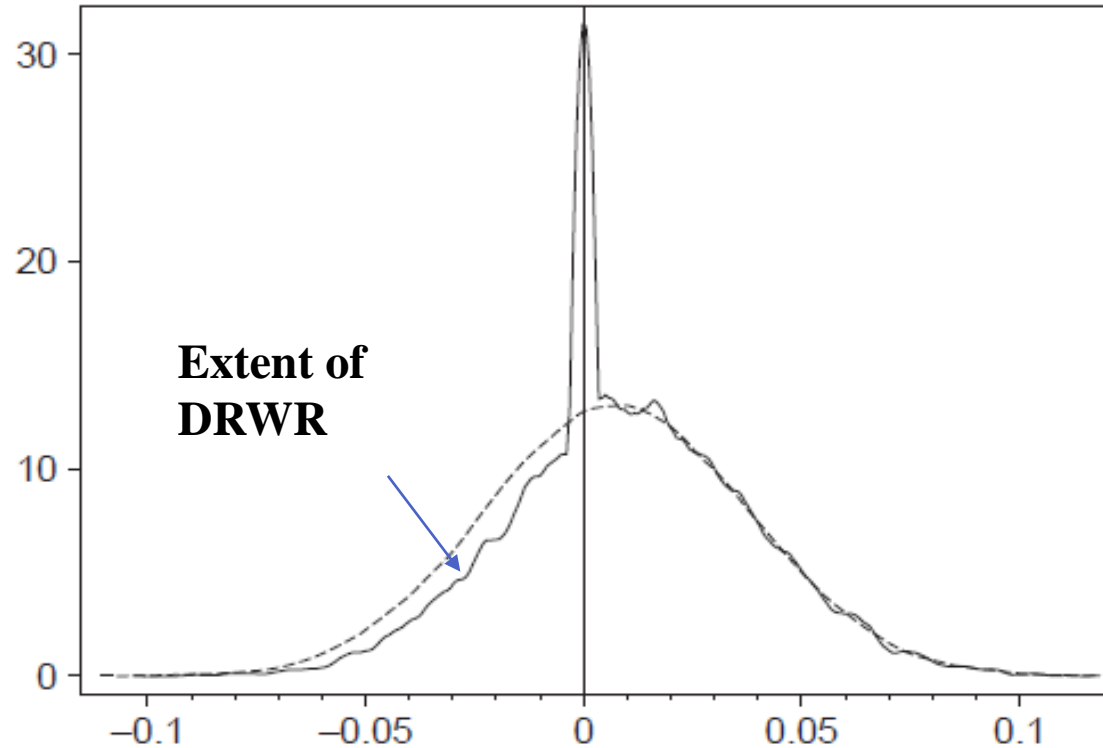
- Empirical implementation
- Empirical issues
- Results

4. Conclusions and policy implications

2. The extent of DRWR

I. THEORETICAL MODEL

Bargaining model, **Holden and Wulfsberg (2009)**.



Predictions

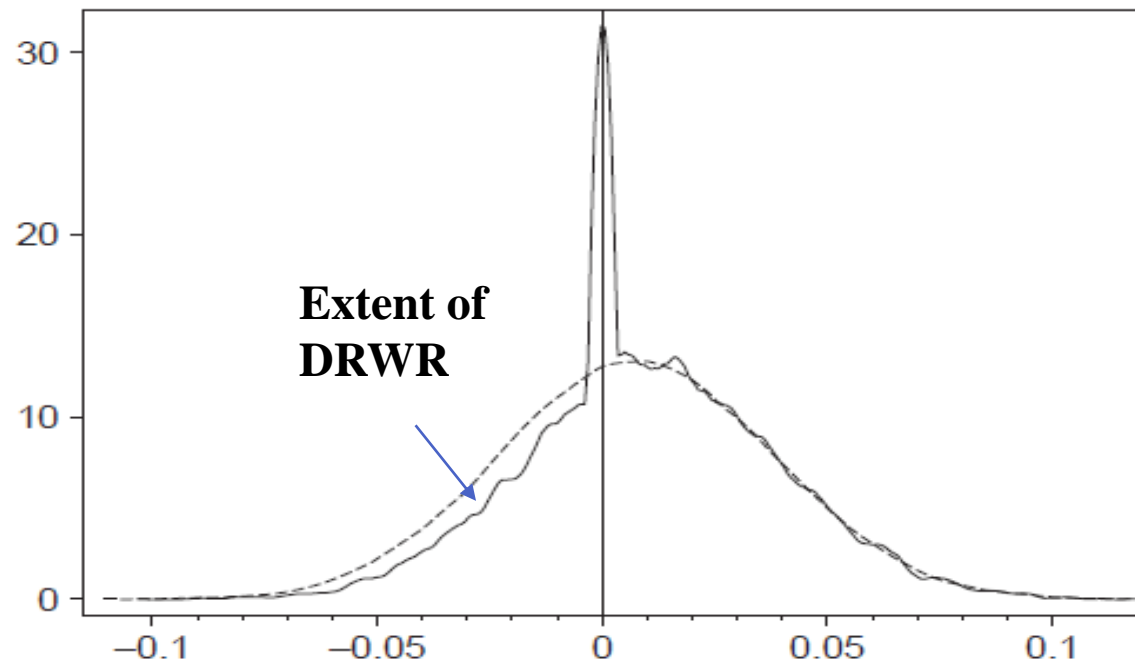
- A spike in the wage change distribution at zero
- Deficit of real wage cuts
- DRWR is more likely in periods of low inflation

- Kernel densities of a notional distribution of real wage changes (dashed line)
- Distribution of real wage changes subject to DRWR (solid line)

2. The extent of DRWR

II. DATA AND EMPIRICAL APPROACH

1. Constructing a notional distribution (free of wage rigidity)
2. Computing empirical distribution (observed real wage changes)
3. Estimating the fraction of real wage cuts prevented – FWCP – (extent of DRWR)



II. DATA AND EMPIRICAL APPROACH

Unbalanced panel (aggregate data)

Δw_{jit} : annual percentage growth of hourly wages (all workers)

$j = 1, \dots, 13$ metropolitan areas

$i = 1, \dots, 59$ industries (two-digits ISIC)

$t = 1, \dots, 13$ years (2002-2014)

Total observations: 9156 distributed across 767-sector-year samples.

Source: Based on micro data from ECH (2001-2006) and GEIH (2007-2014)

II. DATA AND EMPIRICAL APPROACH

1. Constructing the notional distribution (free rigidities) for Colombia

a. Underlying distribution:

Subsample $S^H = 592$ observations from 44 sector year samples.

Criteria:

The median nominal and real wage growth must be above the 75th percentile over all sector-years.

Normalizing the 592 empirical observations

$$\Delta w_s^u \equiv \frac{(\Delta w_{jit} - \mu_{it})}{(P75_{it} - P35_{it})}, \quad j, i, t \in H \quad \text{and} \quad s = 1, \dots, S^H$$

b. Compute the sector-year specific distributions of notional real wage changes

$$\Delta \widetilde{w}_s^{it} \equiv \Delta w_s^u (P75_{it} - P35_{it}) + \mu_{it}, \quad i, t \in H \quad \text{and} \quad s = 1, \dots, S^H$$



II. DATA AND EMPIRICAL APPROACH

2. Computing empirical distribution (observed real wage changes)
3. Estimating a fraction of real wage cuts prevented – FWCP – (Extent of DRWR)

a. Notional incidence rate

$$\tilde{q}(k)_{it} \equiv \frac{\#\Delta\tilde{w}_{it} < k}{S_{it}^H},$$

b. Empirical incidence rate

$$q(k)_{it} \equiv \frac{\#\Delta w_{it} < k}{S_{it}},$$

c. The fraction of wage changes prevented

$$FWCP(k)_{it} = 1 - \frac{q(k)_{it}}{\tilde{q}(k)}$$

2. The extent of DRWR

III. RESULTS

Estimates of DRWR. For $k = 0$.

Years	\tilde{q}	q	<i>FWCP</i>	<i>P – value</i>	<i>S</i>
2002	48.68	37.73	22.50	0.00	721
2003	58.43	50.71	13.21	0.00	704
2004	49.46	44.77	9.47	0.01	708
2005	45.32	40.54	10.55	0.01	708
2006	52.95	48.97	7.51	0.02	680
2007	38.87	31.90	17.93	0.00	699
2008	51.20	45.99	10.18	0.00	711
2009	56.28	50.93	9.52	0.00	701
2010	50.21	41.74	16.88	0.00	702
2011	49.63	44.64	10.06	0.00	699
2012	53.01	48.18	9.10	0.01	716
2013	49.83	44.16	11.37	0.00	702
2014	40.96	36.74	10.31	0.01	705
All observations	49.60	43.60	12.09	0.00	9,156

- Deficit of real wage cuts in Colombia is estimated at 12.09%.
-3.5 times bigger than in OECD economies. (Holden and Wulfsberg 2009).
-Relatively low with respect to the average of 15% for Latin America and the Caribbean countries. (Holden and Messina, 2012)
-Similar to the case of Uruguay (Messina and Sanz-de-Galdeano, 2014).
- A salient feature is the falling path of DRWR.

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2. The extent of DRWR

III. RESULTS

Estimates of DRWR. For $k = 0$.

Sectors	\tilde{q}	q	$FWCP$	$P - value$	S
S1	51.18	34.75	32.10	0.00	446
S2	52.04	31.00	40.43	0.00	500
S3	49.15	43.08	12.34	0.44	3498
S4	48.76	48.23	1.10	0.27	338
S5	51.72	49.11	5.03	0.53	169
S6	44.61	44.67	-0.15	0.00	676
S7	49.31	44.06	10.65	0.00	758
S8	50.60	44.01	13.02	0.00	668
S9	50.59	47.50	6.11	0.00	2103

Notes: Data in percent. (S1) Agriculture, Cattle Ranch, Forestry, Hunting and Fishing; (S2) Mine and Quarry Exploitation; (S3) Manufacturing Industry; (S4) Electricity, Gas and Water; (S5) Construction; (S6) Commerce, Repairing, Restaurants and Hotels; (S7) Transport, Storage and Communication; (S8) Financial and Insurance; (S9) Social, Communal and Personal Services.

- DRWR is not significant in: (S4) electricity, gas and water; (S5) construction; and (S6) commerce, repairing, restaurants, and hotels.

-For S5 and S6, the absence of rigidities may be associated to their high degrees of informality (73.54% and 72.41%, respectively) and low levels of union density (0.72% and 1.72%).

-S4, is the most productive sector, as such, it is the one where wage rigidities are less likely to be binding.

1. Introduction

2. The extent of DRWR

- Theoretical model
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3. Drivers of DRWR

- Empirical implementation
- Empirical issues
- Results

4. Conclusions and agenda

I. EMPIRICAL IMPLEMENTATION

Bargaining model, Holden and Wulfsberg (2009)

DRWR depends on:

- a. Institutional variables
 - Employment protection legislation
 - Union bargaining strength
- b. Economic variables
 - Unemployment rate
 - Inflation (no-lineal effect)

Adjustments and extensions

DRWR depends on:

- a. Institutional variables
 - Union bargaining strength
 - **(Δ)Real minimum wage**
 - **Informal employment rate**
- b. Economic variables
 - **Economic growth**
 - Sectorial Inflation

I. EMPIRICAL IMPLEMENTATION

Adjustments and extensions

$$FWCR_{it} = f (\Delta Y_{it}, \Delta p_{it}, \theta_{it}, \iota_{it}), \quad (7)$$

High correlation Δ Real minimum wage vs. Sectorial Inflation (-0.9232)

$$FWCR_{it} = f (\Delta Y_{it}, \Delta w_{it}^{\min}, \theta_{it}, \iota_{it}), \quad (8)$$

$$FWCR_{it} = f (\Delta Y_{it}, \Delta \pi_{it}, \theta_{it}, \beta_4 \iota_{it}). \quad (9)$$

II. EMPIRICAL ISSUES

- **Econometric methodology:**

Poisson and negative binomial regressions.

$$[1 - FWCP(k)] = \frac{Y(k)_{it}}{\hat{Y}(k)_{it}} = e^{x'_{it}\beta + \varepsilon_{it}}, \quad \text{if } \hat{Y}(k)_{it} > 0,$$

- **Estimation method:**

Maximum Log-Likelihood estimator including fixed effects across sectors.

3. Drivers of DRWR

III. RESULTS

Estimates. Binomial regressions.

Dependent variable: $FWCP_{it}$						
	Equation (7)		Equation (8)		Equation (9)	
	Pool	FE	Pool	FE	Pool	FE
	(1)	(2)	(3)	(4)	(5)	(6)
ΔY_{it}	-0.06** [-2.29]	-0.05* [-1.73]	-0.06** [-2.35]	-0.05* [-1.78]	-0.06** [-2.34]	-0.05** [-1.71]
Δp_{it}	0.03** [2.23]	0.02** [2.05]				
θ_{it}	-0.05** [-3.18]	0.06 [1.38]	-0.05** [-3.10]	0.06 [1.47]	-0.05** [-3.06]	0.06 [1.46]
ι_{it-1}	-0.02*** [-3.75]	-0.02*** [-2.91]	-0.02*** [-3.71]	-0.02*** [-2.83]	-0.02*** [-3.68]	-0.06*** [-2.79]
Δw_{it}^{\min}			-0.03** [-2.06]	-0.02** [-1.90]		
$\Delta \pi_{it}$					0.03** [2.01]	0.01 [1.35]
c	3.78*** [12.89]	4.38*** [11.61]	3.94*** [13.71]	4.46*** [11.21]	3.90*** [13.51]	4.43*** [11.20]
<i>Obs.</i>	117	117	117	117	117	117
<i>LL</i>	-45.90	-42.44	-45.91	-42.45	-45.93	-42.46
<i>LL - alpha</i>	103.6 (0.00)	28.68 (0.00)	102.6 (0.00)	103.6 (0.00)	103.6 (0.00)	30.00 (0.00)

Notes: FE, sectorial fixed effects. *** Significant estimates at 1%; **, at 5%; *, at 10%.

Z-test in brackets; P-values in parentheses. *LL*, Log-Likelihood;

LL - alpha, Log-Likelihood ratio test of alpha=0.

3. Drivers of DRWR

III. RESULTS

Average marginal effects. Binomial regressions.

	Equation (7)		Equation (8)		Equation (9)	
	Pool	FE	Pool	FE	Pool	FE
	(1)	(2)	(3)	(4)	(5)	(6)
ΔY_{it}	-0.76** [-2.29]	-0.61* [-1.74]	-0.78** [-2.35]	-0.63* [-1.79]	-0.78** [-2.33]	-0.61** [-1.72]
Δp_{it}	0.37** [2.27]	0.23** [2.07]				
θ_{it}	-0.72*** [-2.90]	0.77 [1.38]	-0.71** [-2.83]	0.83 [1.48]	-0.71** [-2.79]	0.83 [1.46]
ι_{it-1}	-0.25*** [-3.31]	-0.23*** [-2.92]	-0.25*** [-3.28]	-0.22*** [-2.83]	-0.25*** [-3.26]	-0.22*** [-2.80]
Δw_{it}^{\min}			-0.35** [-2.09]	-0.21** [-1.93]		
$\Delta \pi_{it}$					0.35** [2.01]	0.19 [1.36]

- Economic growth reduces DRWR as expected.
- Sectoral prices inflation increases DRWR. This impact is in contrast to the common finding.
- Trade union density has no significant influence on DRWR.

Notes: FE, sectorial fixed effects. *** Significant estimates at 1%; **, at 5%; *, at 10%.

Z-test in brackets.

3. Drivers of DRWR

III. RESULTS

Average marginal effects. Binomial regressions.

	Equation (7)		Equation (8)		Equation (9)	
	Pool	FE	Pool	FE	Pool	FE
	(1)	(2)	(3)	(4)	(5)	(6)
ΔY_{it}	-0.76** [-2.29]	-0.61* [-1.74]	-0.78** [-2.35]	-0.63* [-1.79]	-0.78** [-2.33]	-0.61** [-1.72]
Δp_{it}	0.37** [2.27]	0.23** [2.07]				
θ_{it}	-0.72*** [-2.90]	0.77 [1.38]	-0.71** [-2.83]	0.83 [1.48]	-0.71** [-2.79]	0.83 [1.46]
ι_{it-1}	-0.25*** [-3.31]	-0.23*** [-2.92]	-0.25*** [-3.28]	-0.22*** [-2.83]	-0.25*** [-3.26]	-0.22*** [-2.80]
Δw_{it}^{\min}			-0.35** [-2.09]	-0.21** [-1.93]		
$\Delta \pi_{it}$					0.35** [2.01]	0.19 [1.36]

Notes: FE, sectorial fixed effects. *** Significant estimates at 1%; **, at 5%; *, at 10%.

Z-test in brackets.

- Labor informality exerts a significant negative influences. (Ahmed et al., 2014 and Batini and Levine, 2010).
- Real minimum wage growth generates a fall in DRWR.
- Relative prices exert a positive influence.

The way wages are fixed in Colombia provide three main channels by which inflationary pressures may enhance real wage rigidities.

1. The minimum wage anchor.
2. Backward looking wage setting, and wage-price feedback.
3. Inflation persistence.

Christoffel and Linzert (2012) show that larger degrees of DRWR tend to foster inflation persistence.

I. CONCLUSIONS

- Deficit of real wage cuts by 12%.
About 12% out of 100 notional real wages cuts do not result in an observed wage cut due to DRWR.
- Large differences at sectorial level (40% vs.1%).
- DRWR in Colombia is not fundamentally connected to the wage bargaining system. On the contrary, the real minimum wage and labor informality appear as the crucial drivers.

II. POLICY IMPLICATIONS

- Our results imply that Colombia has two main mechanisms to fight rigidities:
 1. The most effective one, is to boost economic growth.
 2. Is to embrace labor market institutional reforms.
- A far-reaching reform of the wage setting system. This reform should aim at stablishing a new system of collective bargaining in which:
 1. Wages become attached to productivity.
 2. Wages start being fixed over expected prices.

The extent of DRWR

- Growth real wage : formal vs. informal
- Notional distribution : To construct the underlying distribution, different dispersion measures must be considered.
- The empirical and notional incidence rate should be calculated for different floors wage changes.

Drivers of DRWR

- Omitted variables:
Payroll taxes
- Simultaneity between rigidity and inflation:

The combination of Negative Binomial regressions and instrumental variable methods (such as GMM) has not yet been used in a context such as ours. Even more, although these methods are available, the marginal effects cannot be computed as we do in our analysis.