

The impact of training on wages and productivity: evidence from Argentinean SMEs.

Barletta, F.; Castillo, V.; Pereira, M.; Robert, V.; Suarez, D. and Tumini, L.

University of General Sarmiento – Ministry of Labor

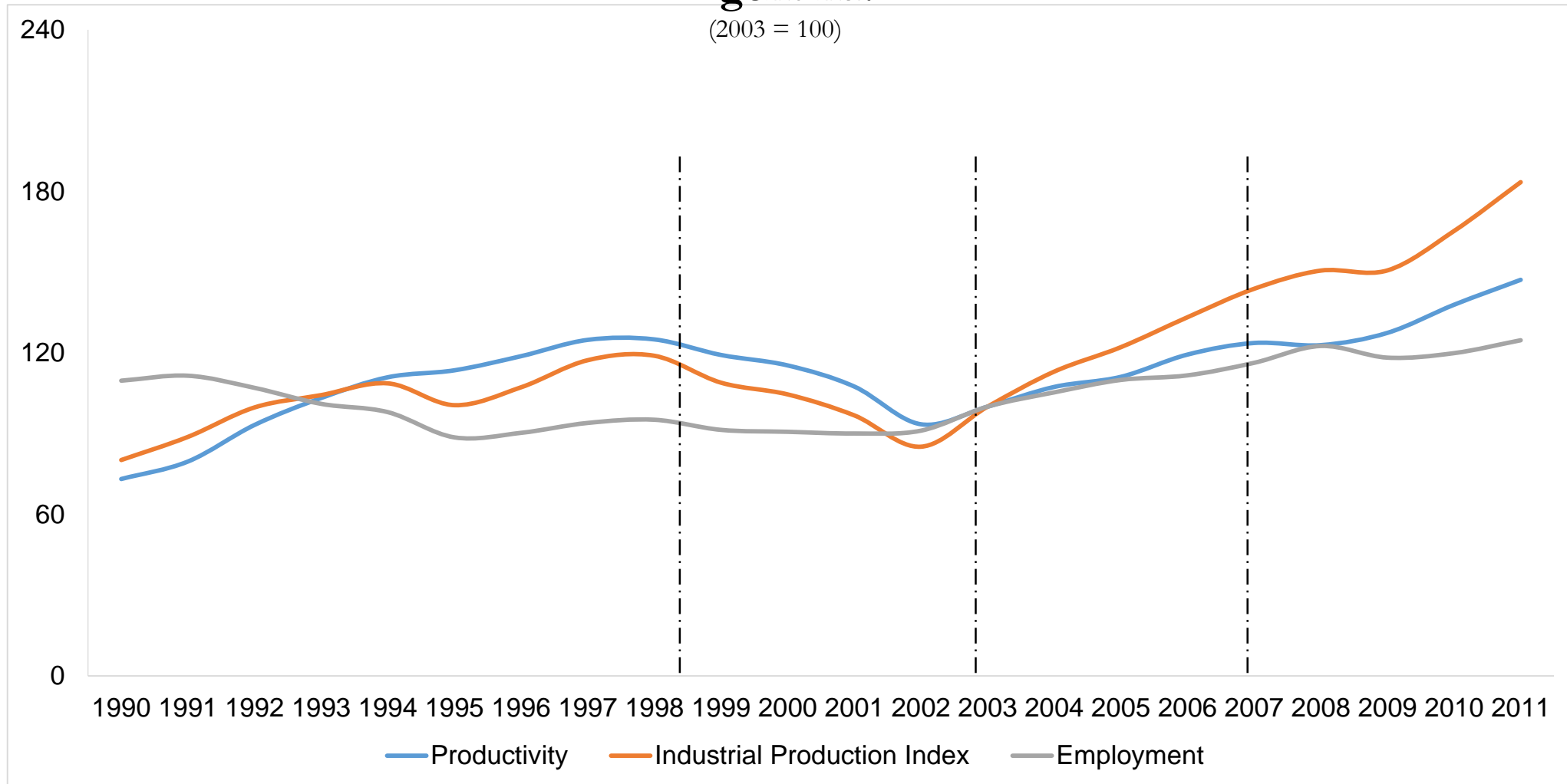
Argentina

Outline

1. Motivation
2. Background
3. Objectives
4. Hypotheses
5. Methodology
6. Results
7. Conclusions

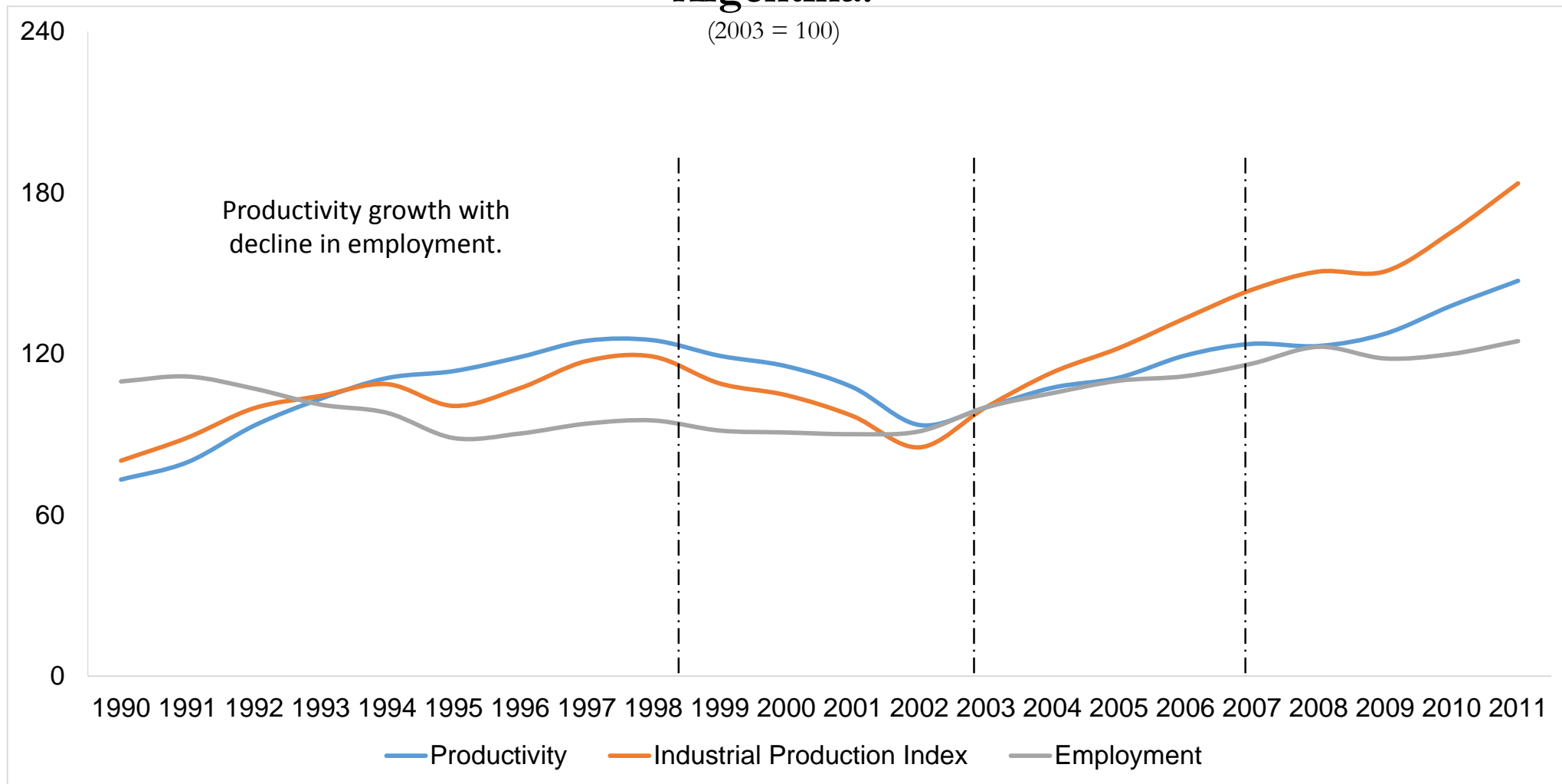
Motivation

Productivity, employment and industrial production growth in manufacturing. Argentina.



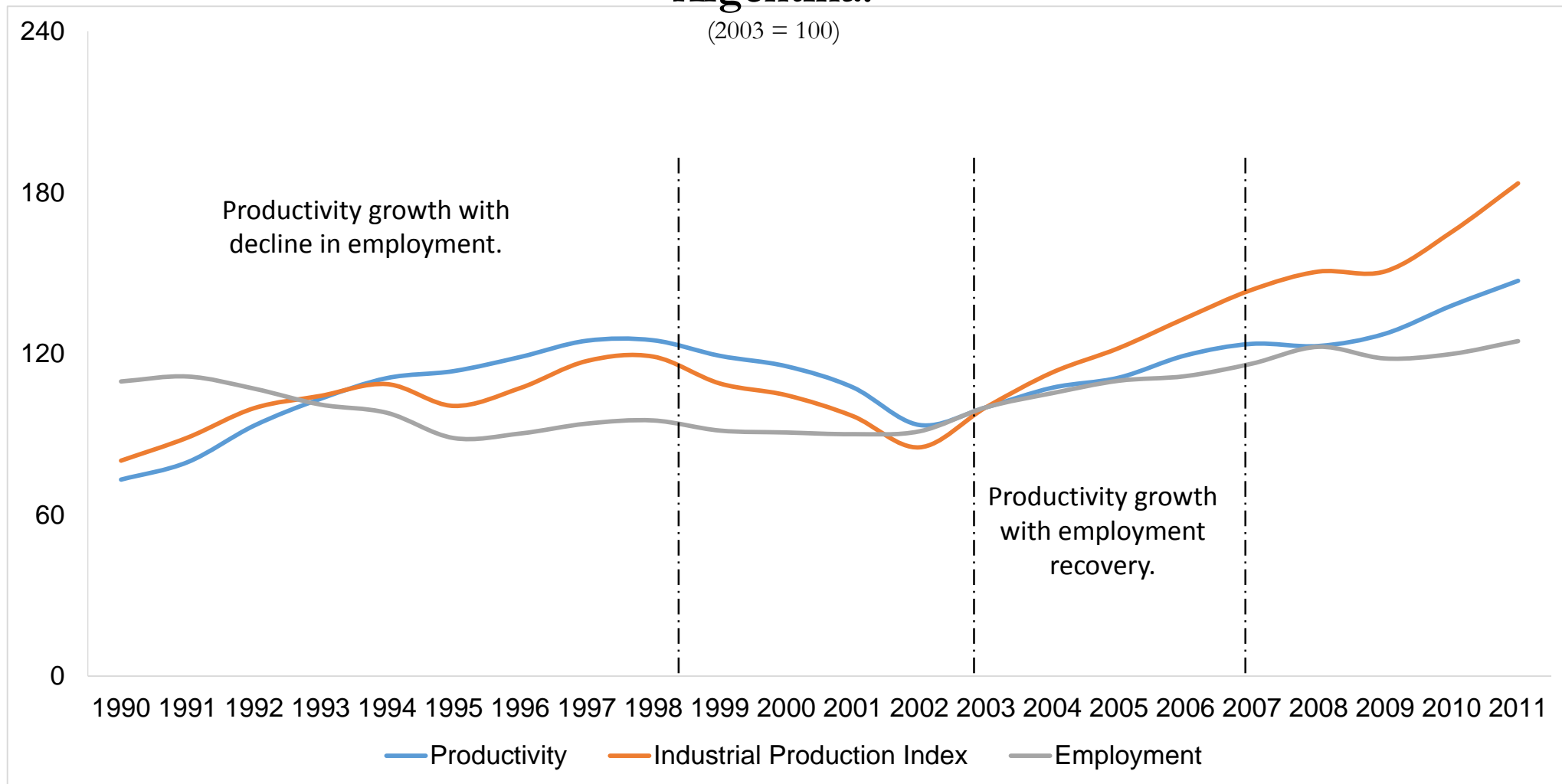
Motivation

Productivity, employment and industrial production growth in manufacturing. Argentina. (2003 = 100)



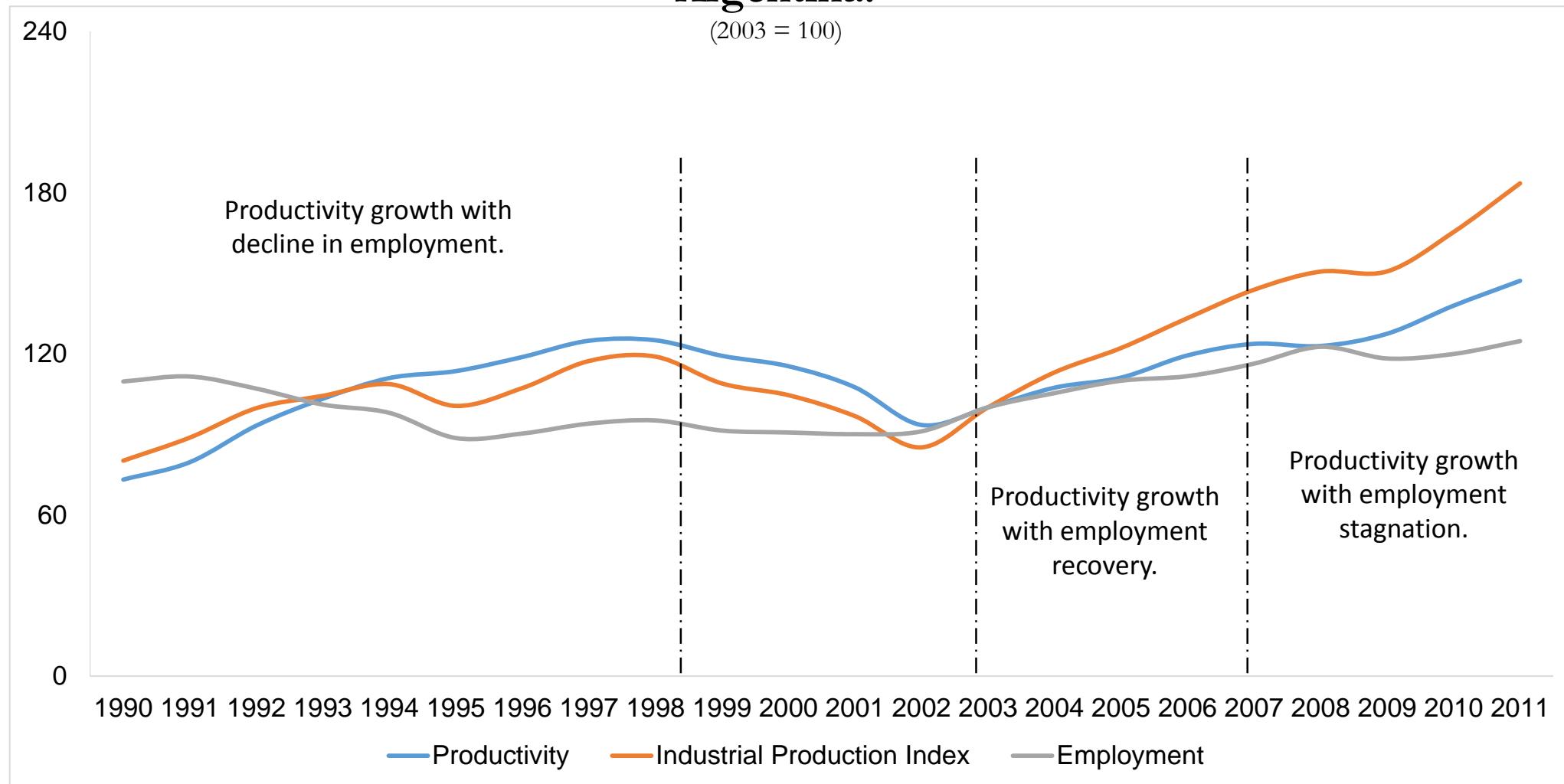
Motivation

Productivity, employment and industrial production growth in manufacturing. Argentina. (2003 = 100)



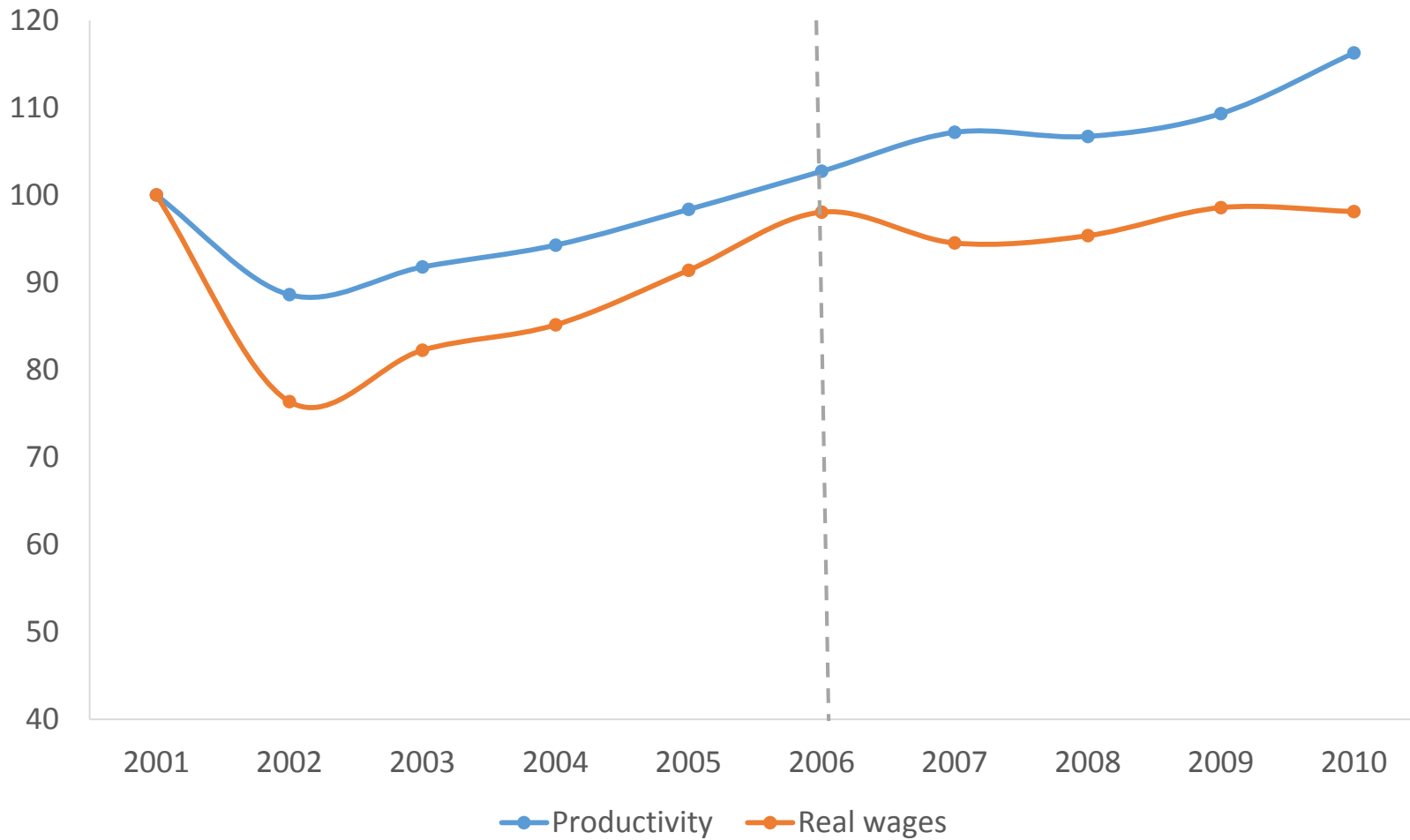
Motivation

Productivity, employment and industrial production growth in manufacturing. Argentina. (2003 = 100)



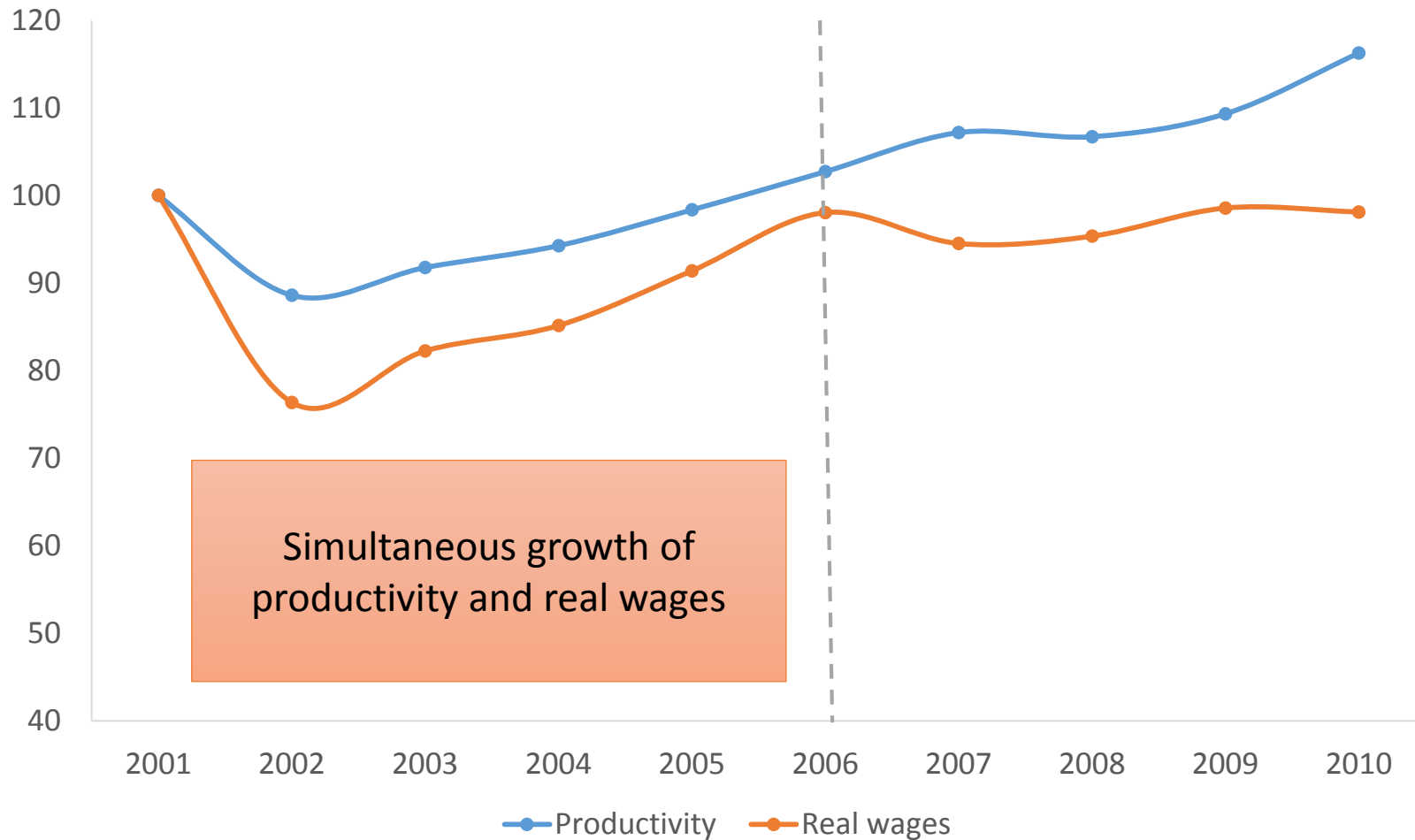
Motivation

Productivity and real wages. Argentine economy.
(2001=100)



Motivation

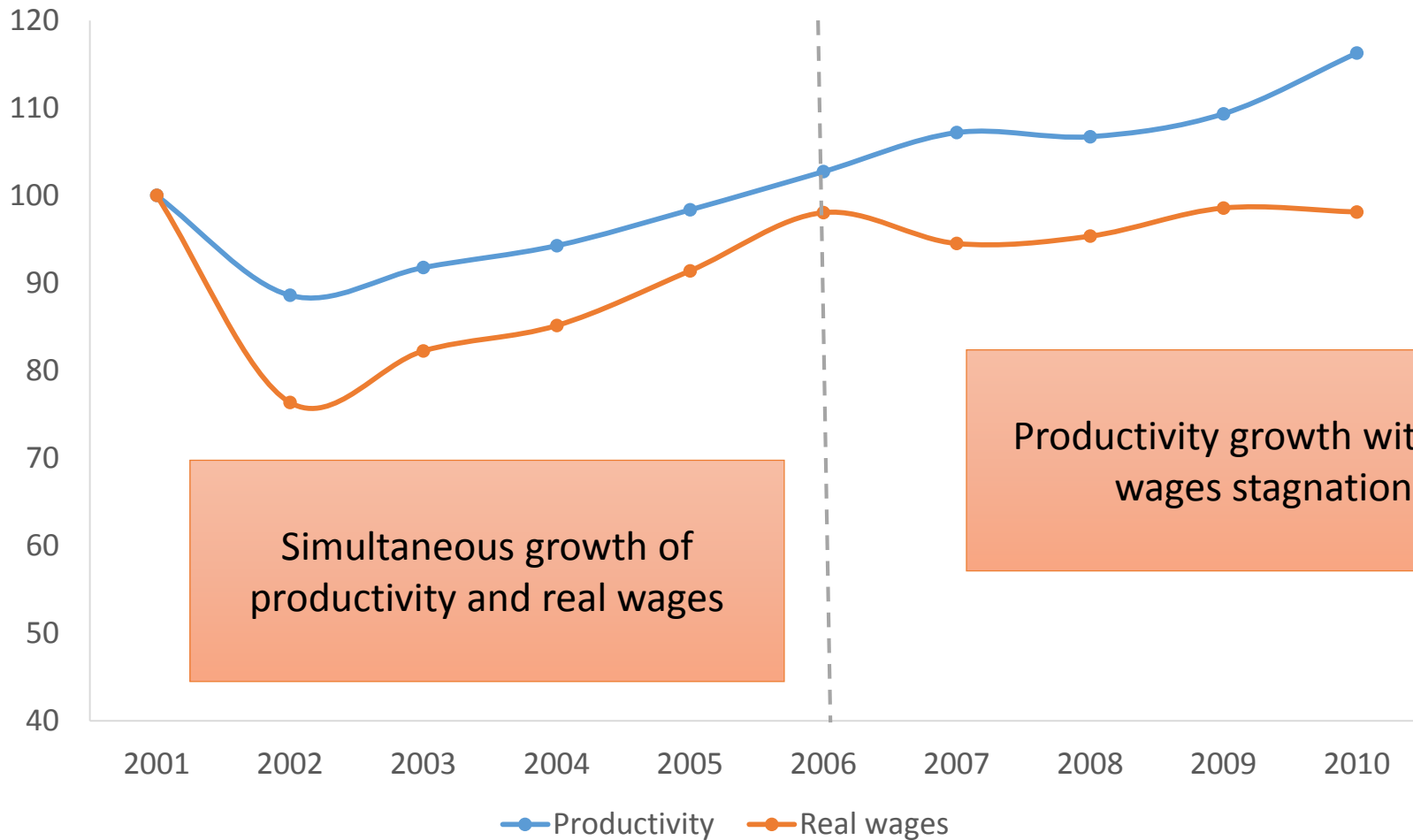
Productivity and real wages. Argentine economy.
(2001=100)



Motivation

Productivity and real wages. Argentine economy.

(2001=100)



Motivation

The recent deceleration of growth, increase of inflation and stagnation of real wages have opened up a debate about:

- the mechanisms of transmission of productivity gains into higher wages and,
- the factors that impact on this relationship (productive structure/ labor institutions).

Background

Structural change: Productivity growth explained by changes in the productive structure (Peirano et al 2010; Lavopa, 2007, Cenda, 2010, Azpiazu and Shorr, 2010, Coatz et. al 2011, Santarcángelo et al 2011, Fernandez Burga and Porta, 2008, Basualdo et al, 2010, Roitter, et al 2013)

Human capital and wage: Effects of education on wages (Beccaria et al 2005, Beccaria and Maurizio, 2014, Groisman, 2014).

Innovation studies: Productivity growth explained by innovation activities (Robert et al, 2013; Crespi and Zuniga, 2012).

Labor institutions: Wages growth explained by the evolution of labor market institutions -collective bargaining agreements, minimum wage- (Palomino and Trajtemberg, 2006, Novick et al 2007, Sarabia et al 2010)

However... There is no evidence about productivity – wage relationship.

Our interest: how is this relationship at firm level?

Objectives

- Explore productivity – wage relationship at firm level.
 - Are wages a good proxy of productivity?
 - If not, which is the gap between wages and productivity?
- Explore the factors that intermedate the relationship between wages and productivity:
 - Sectorial R&D intensity (Cepal, 2012)
 - Labour institutions (Freeman and Medoff, 1984)

Following Conti (2005) and Dearden et al (2006) we study the relationship between salaries and productivity through a third variable: training for innovation and production.

Hypotheses

H1. The impact of training on productivity and wages. Firms with trained workers show, on average, higher levels of wage and productivity. However, the impact of training on productivity is higher than the impact on salaries.

Hypotheses

H1. The impact of training on productivity and wages. Firms with trained workers show, on average, higher levels of wage and productivity. However, the impact of training on productivity is higher than the impact on salaries.

H2. The effect of R&D intensity on productivity-wages relationship. The gap between productivity and wages tends to decrease when one moves from low to medium and high tech sectors.

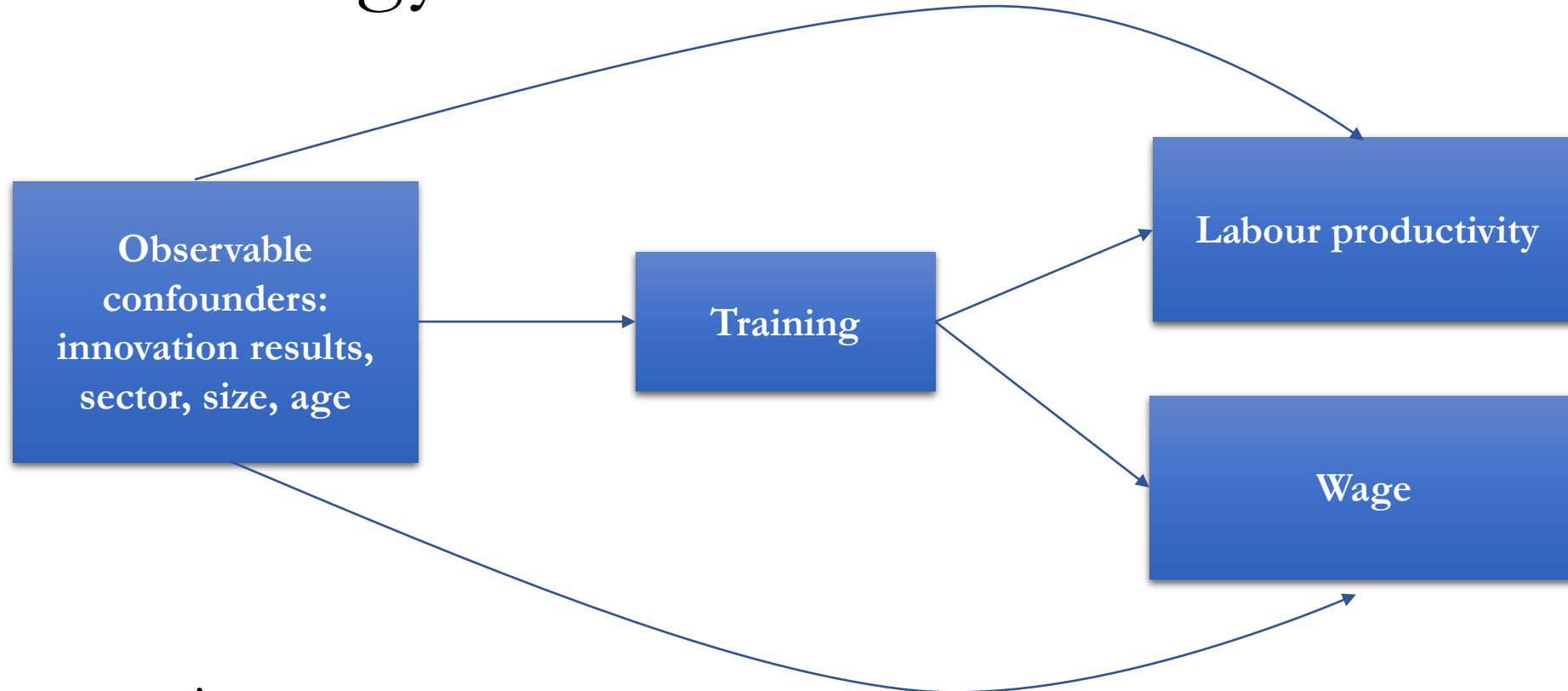
Hypotheses

H1. The impact of training on productivity and wages. Firms with trained workers show, on average, higher levels of wage and productivity. However, the impact of training on productivity is higher than the impact on salaries.

H2. The effect of R&D intensity on productivity-wages relationship. The gap between productivity and wages tends to decrease when one moves from low to medium and high tech sectors.

H3. The effect of labor institutions on productivity-wages relationship. The gap between salaries and productivity tends to decrease when one moves from activities where collective bargaining (union-led negotiations) led to wage increases below the mean to activities where negotiations led to over-the-mean increases.

Methodology



Two strategies:

1. Non- parametric estimation. **Propensity score matching** (Kernel, for small samples)
2. Parametric technique. **Double-robust estimation** (Lunceford and Davidian, 2004).

Methodology

- **PSM**

1° Estimation of the probability of training conditioned by a set of observable factors.

2° Match each firm in the treatment group with a firm (or group of firms) of the control group that are strongly similar in terms of their observable factors.

3° The difference between both groups is only due to training and is named “Average Treatment effects on Treated” (ATT).

- **Double- robust estimation**

Combine in the same estimator, the model for estimating the propensity score and the model for estimating the outcome variable.

Data and variables



- 1416 SMEs from manufacturing.
- **SMEs Map survey.** Information about: productivity, wages, training, innovation results, control variables (size, age).
- **Ministry of Labour.** Information about: negotiated wages (salary from collective bargaining + unremunerated payments obtained in negotiations), annual average growth rate of employment and wages in the period 2003-2007.

Treatment Status	Training activities 2006-2008 (%)
Yes	61,5
No	39,5
Total	100

Results I. Propensity score matching.

		Output	N (Treated)	N (Ctrl Group)	ATT (Matched)	T
H1	1. Total Sample	ln(prod)	823	508	0.273	5.493
		ln(wage)	823	508	0.198	5.560
		Gap			0.08	
H2	2. Low Tech	ln(prod)	367	254	0.342	4.521
		ln(wage)	367	254	0.197	3.471
		Gap			0.15 ↑	
	3. High and Medium Tech	ln(prod)	454	242	0.208	3.420
		ln(wage)	454	242	0.183	3.460
		Gap			0.02 ↓	
H3	4. Collective bargain has led to Δ Wages below average	ln(prod)	510	337	0.287	4.102
		ln(wage)	510	337	0.203	4.240
		Gap			0.09 =	
	5. Collective bargain has led to Δ Wages above average	ln(prod)	313	163	0.260	3.274
		ln(wage)	313	163	0.185	3.43
		Gap			0.07 =	

Results II. Double-robust estimation.

Model	Hypothesis 1		Hypothesis 2				Hypothesis 3			
			Low Tech		High and Medium Tech		Collective bargaining leads to Δ wages below average		Collective bargaining leads to Δ wages above average	
Output	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
	Ln (prod)	Ln (wage)	Ln (prod)	Ln (wage)	Ln (prod)	Ln (wage)	Ln (prod)	Ln (wage)	Ln (prod)	Ln (wage)
Training	0.253***	0.183***	0.307***	0.185*** 	0.211***	0.183*** 	0.252***	0.185*** =	0.247***	0.180*** =
Rate_emp0307	0.063	-0.270***	-0.138	-0.224*	0.156	-0.282**	-0.077	-0.308**	0.193	-0.210
Rate_wage0307	-0.686**	-0.367*	-1.347***	-0.447*	0.065	-0.210	-1.303***	-0.772***	0.620	0.501
Innovation	0.150***	0.033	0.116*	0.068	0.179**	0.000	0.124**	0.037	0.193**	0.003
Age	-0.004**	-0.005***	-0.003	-0.006***	-0.003	-0.005***	-0.003	-0.005***	-0.003	-0.005**
_cons	18.673***	20.067***	16.082***	21.397***	16.495***	19.553***	17.317***	20.037***	16.728***	18.635***
chi2 p	6.66e-23	2.67e-29	1.14e-13	8.07e-13	1.31e-09	4.17e-12	2.69e-16	5.37e-20	7.36e-10	1.61e-11
N	1326	1322	611	609	699	697	850	846	481	481

Conclusions

- The impact of training on productivity is higher than the impact on wages. Gains from training are not fully translated to wages.
- The gap tends to decrease among medium- and high-tech sectors, which provides evidence regarding the impact of the process of structural change on equity.
- However, labor institutions would not seem to have any contribution to close the gap.

The impact of training on wages and productivity: evidence from Argentinean SMEs.

Florencia Barletta

mfbarletta@gmail.com

University of General Sarmiento
Argentina