REAL WAGES AND INCOME DISTRIBUTION: AUSTRALIA AND NEW ZEALAND *VIS-À-VIS* ARGENTINA AND URUGUAY, 1870-1913

LUIS BÉRTOLA
Economic and Social History Programme
universidad de la república- uruguay

GABRIEL PORCILE

Department of Economics,
universidad federal de parana, brazil

INTRODUCTION

This paper aims to contribute to the debate on the long run economic performance of Argentina and Uruguay as compared to Australia and New Zealand. Many interesting works on this topic were produced in the eighties[1], aimed at explaining why countries which were so similar as regards factor endowments and international specialisation, featured what seemed to be so different paths of growth in the XXth century. While the interest in the topic subsequently receded, the revival of growth theory (NGT) in the late eighties, the associated literature on convergence and divergence of the nineties, as well as the developments in the field of economic history,encourage revisiting the old debate. In addition, it is addressed whether real wages convergence – as different from the traditional measure of convergence which focus on GDP per capita – can be considered a stylsed fact of these economies in the long run.

NGT[2] moved in many respects away from the classical Heckscher-Olhin-Samuelson (HOS) framework towards a focus on technology, multiple equilibria and path-dependency. Factor price equalisation is no longer a straightforward result in the new models of endogenous growth. In this paper we draw from the (new and not-so-new[3]) insights suggested by NGT to analyse GDP per capita and real wages convergence in the River Plate and Australasia. The main point of the paper is that the classical globalisation forces favouring convergence (trade, capital and labour mobility) operate within a technology-driven productivity-growth constraint. In the presence of increasing returns, these forces are either unable to deter divergence or even reinforce cumulative forces that lead to divergence[4].

Path-dependency and multiple equilibria highlights the critical role of institutions and history (including the role of relatively minor differences in the initial conditions which are subsequently greatly amplified by cumulative processes, as stated by Brian Arthur And Paul David) on long term growth. There is nothing automatic in technology diffusion, international trade and the distribution of productivity among groups, classes and countries. In this paper, however, we focus on the most immediate determinants of GDP per capita and real wages convergence and left institutional analysis for future research. The reason why is that it is necessary first to clearly set the stylised facts we need to explain. This point still a matter of controversy in the current literature.

The paper is divided in five sections. Section I briefly reviews the literature on GDP per capita

convergence and real wages convergence. Section II compares long-run economic growth in the Southern Cone countries, Australia and New Zealand, using as a reference the GDP per capita of four leading economies. Section III performs a similar comparison for movements in real wages until the 1930s. Section IV offers a preliminary econometric test on the variables shaping the evolution of real wages, using our estimates for Uruguay and Greasley, Madsden and Oxley´s (therefrom GMO) estimates for Australia and Canada. The main conclusions are summarised in a final section.

A BRIEF REVIEW OF THE LITERATURE

As detailed presentations of NGT can be found elsewhere[5], we will focus on a few papers that explore the interconnections between growth and development theories . As mentioned, they are related to increasing returns, multiple equilibria and path dependency, which to a large extent reflect technological innovation and diffusion in the international economy . In this literature, history and institutions matter to the extent that they can change irreversibly the growth path.

In the Solow tradition, the international economy is described as a system in which all countries converge to an unique stable equilibrium, although it is recognised that the parameters defining the steady state are not necessarily the same for all countries (which gives rise to the concept of club convergence). Recent papers suggest that multiple equilibria offer a better description of international growth (see on this Durlauff and Quah, 1998). Poverty traps and cumulative causation have become a central part of growth analysis from this perspective[6].

In effect, Baldwin *et al* (1998) show that falling trade costs can produce three stages of growth when localised technological spillovers (and related increasing returns) are present. Initially falling trade costs have positive, conventional static effects on welfare, but no effect on industrial location. World income is evenly distributed across regions. At a certain point the process of reduction of trade costs triggers massive income divergence as industry agglomerates in the North, which fully exploits localised spillovers. This defines a qualitatively different stage of growth, which renders a core-periphery macrostructure in equilibrium. After that, the economy enters in a third phase in which again static welfare benefits from trade dominates (due to price convergence in North and South) over the deleterious effects on the South of industrial concentration in the North. Still, the third stage fails to fully erode North-South income asymmetries[7].

A particularly interesting contribution has been recently set forth by Ros (2000, chapter 8), focusing on growth and real wages in land-rich open economies in the long run – precisely the type of economies we are addressing in this comparative study. He identifies two main approaches to the problem.

From one hand, the literature on the Dutch disease stresses that a booming primary exporting sector may negatively affect industrial development. Although the expression Dutch disease was originally coined to designate the consequences of an overvalued currency for industrial growth, the trade-off between the primary and industrial sectors could be generated by other mechanisms, like competition in labour and capital markets. As in the previous model, it is assumed that industry produces under increasing returns (due to technological externalities) and the primary sector under decreasing returns. In equilibrium, industry will represent a smaller proportion of the economy in the land-rich country as compared to the land-poor country. We then get the paradoxical result that real

wages and productivity will be lower in the land-rich country, which ends up with less (at the steady state) of the increasing returns activity[8].

On the other hand, the "vent for surplus", staple and linkage theories suggest that under certain conditions primary exports could foster industrial growth. Under international labour mobility, capital accumulation and migration reinforce each other so that in the steady the land-rich country features higher real wages and a higher stock of capital in the increasing-returns manufacturing sector than the land-poor country[9]. Another mechanism by which it is possible to get a virtuous interplay between industry and natural resources is represented by linkage effects, which may involve an intermediate sector operating under increasing returns and imperfect competition[10].

Ros (2000, p.234) observes that these two apparently opposite views can be reconciled if one admits that at low income-levels the abundance of natural resources is conducive to higher rates of growth, but in the long run real wages depend critically on the ability of the country to move towards increasing returns activities.

Demand side variables can also be affected by the pattern of specialisation. McCombie and Thirlwall (1994, chapter 3) have argued that the long run rate of economic growth consistent with balance-of-payments equilibrium depends on the ratio between the income elasticity of the demand for exports and imports . We have already explored this literature in a previous paper and therefore we will not develop it further[11]. For our present discussion it is suffice to say that in general agricultural goods present a low income elasticity of demand. In the presence of increasing returns in industry and lock-in effects[12] in the pattern of specialisation, a land-rich country specialised in agriculture will exhibit a very low income-elasticity ratio, leading to sluggish growth in the long run.

From the standpoint of real wages determination, we can consider this model as a particular case of traditional Keynesian (driven by effective demand) models. For the sake of simplicity, lets summarise the argument in terms of the static Hicksian foreign trade supermultiplier, in which effective demand depends solely on exogenous exports and the income elasticity of the demand for imports. Effective demand defines the level of total output, which in turn (mediated by the production function) defines the amount of labour demanded[13]. To this Keynesian labour demand curve we add a (positively inclined) labour supply curve and thereby get the equilibrium levels for real wage and employment. At variance with the original Keynes´ model, in this case wages and production are positively correlated and both depend on the income elasticty of the demand for exports and imports.

In sum, the NGT models presented above challenge the idea that factor movements across borders could be able to bring about factor price equalisation. In some cases, they may even produce further divergence. The impact of the classical forces of globalisation – trade, capital and labour mobility - depends on the nature of technology - which in the models presented above is defined in the simplest form, namely technological externalities. Multiple equilibria and path-dependency arise, which suggest the need to address the problem of convergence in terms of different regimes of convergence and divergence rather than as trajectories towards a single equilibrium.

II. EVIDENCE ON INCOME CONVERGENCE/DIVERGENCE IN THE RIVER PLATE AND AUSTRALASIA

In earlier works we approached the convergence/divergence debate focusing on the relative long

run performance of the Southern Cone countries as compared to the leading countries of the world economy. This section defines convergence in terms of real GDP per capita as it is usual in the literature on this topic. The evolution of convergence and divergence between Argentina, Brazil, Uruguay (ABU), Australia and New Zealand, and the four developed countries, is shown in graph 1.

Lets briefly comment on graph 1. It can be seen that Argentina achieved rapid catching up with the leaders, forging slightly ahead in the first decade of the twentieth century. If one removes the USA from the sample of advanced countries, the Argentine advantage in terms of GDP per capita persisted for more than three decades (1895-1929). On the other hand, Argentina systematically lost ground when compared to the USA. Argentine relative growth lost momentum in the first decade of the XXth century and steadily declined since *c.* 1913. By the end of the 1980s, Argentine GDP per capita had fallen from 110% to 40% of the average GDP per capita of the four advanced countries used as benchmarks.

Uruguay diverged in the 1873-1900 period, but it did so from levels of GDP per capita similar to or even higher than those of the sample of advanced countries. During the three first decades of the twentieth century, Uruguay kept pace with the core. Thereafter, it followed with minor differences the trajectory of Argentina. Still, Uruguay was successful in halting divergence in 1945-54 and 1974-78, periods which represented, respectively, the heydays of import-substitution (during the democratic *Neo-Batllista* government) and of export promotion (at the initial stage of the military government in the seventies). Conversely, Argentina diverged at a less intense rate in the sixties than in any other period after World War II.

It is interesting to observe that we did not find any clear-cut relation between openness (measured as the ratio of exports to GDP) and GDP per capita convergence. Institutional variables and the ability to change the pattern of specialisation towards the new fast-growing sectors of the second post-war period seemed to be much more relevant to explain convergence than a crude measure of openness[14].

Australia and New Zealand are good examples of GDP per capita convergence among OECD countries. By the 1870s, both had per capita income levels significantly higher than the average of the four countries used as reference. Both declined in relative terms until the beginning of the XXth Century, especially Australia, but subsequently improved positions until the 1910s. Australia fell behind until the 1960s, when it stabilised at a level fairly similar to the reference countries. New Zealand, on the other hand, showed a more unstable path, featuring retardation in the 1920s, forging ahead in the 1930s and 1940s, and lagging behind since the 1950s.

It can be seen in Graph 2 that Australia and New Zealand displayed since the beginning a significant advantage in relation to Argentina and Uruguay. A remarkable fact is that the gap (in terms of GDP per capita), expressed as a percentage of the income of the reference countries, *was surprisingly stable*. As shown in Graph 3, if we eliminate the average (level) differences between Argentina and Australia, on the one side, and between New Zealand and Uruguay, on the other, the similarities in the evolution of the gap are striking. In other words, the advantage of Australia and New Zealand in relation to Argentina and Uruguay, respectively, was a constant share of the income per capita of the four reference countries. This finding reinforces the idea of the existence of similarities in the long-run determinants of development in the River Plate and Australasia, probably related to their much similar insertion in the international economy. It also suggests that original

differences in income per capita could have played a decisive role in shaping subsequent relative positions – an observation which is broadly consistent with the type of cumulative effects analysed by Setterfield (1997) from a Kaldorian perspective.

2. REAL WAGES AND INCOME DISTRIBUTION 1870-1940

Williamson (1998) made an important contribution to the convergence/divergence debate by focusing on factor prices instead of GDP per capita. Looking at convergence in factor prices offer some advantages over GDP convergence. Real wages provide a more accurate view of the living standard of the majority of the population and it also takes into account the influence of the international migration of labour, a large scale phenomena at the beginning of the XXth Century[15].

In earlier works we estimated Argentine and Uruguayan benchmarks and real wages in terms of PPP[16]. The results, expressed in relative terms with respect to the average of the same four core countries used as reference in the previous section, are shown in graph 4, where Australian real wages are also included.[17] As the Williamson data base is based on non-qualified workers, his Australian series are compatible with our series for Argentina and Uruguay. However, we used the benchmark estimate proposed by GMO, which implies that by 1905 Canadian wages were only 20% higher than Australian. .

The series for the South American countries did not show any clear convergent trend. They indeed closely resemble the evolution of GDP per capita convergence in 1870-1939.[18] As regards the evolution of real wages, different situations can be identified: (a) there never was convergence with respect to the United States; (b) convergence did occur in relation to the Latin European countries, especially when European emigration increased by the end of the XIXth Century[19]; (c) divergence was more intense during the First World War years and after the Great Depression.

In the case of Australia, rapid convergence with the European countries occurred in 1870-1913, but real wages did not converge with American nor Canadian wages. The latter was studied in detail by GMO, who conclude that "(N)either the Williamson nor the Pope and Withers data provide evidence that Canadian and Australian real wages converge in the period 1870-1913. These findings support Allen's view that there was not a tightly integrated labour market across the English-speaking world."[20]

With respect to the relation between Australia and the River Plate countries, it is possible to distinguish two period, 1870-1890 and 1890-1913. In 1870-90 the Australian economy did not perform well, due to a weak export performance related to the worsening of the terms of trade, especially in the 1880s.[21] During this period both Argentina and Uruguay converged with Australia in terms of GDP per capita and real wages. Convergence slowed down in the subsequent (1890-1913) period (see Graphs 5 and 6) and changed sign in the case of the Argentine real wages.

A common feature to the three countries was the slower growth of wages in relation to the growth of the GDP per capita (see graph 7), especially since 1900. In Australia, the fall in the real wage/GDP per capita ratio was just transitorily halted in the 1890s, when immigration decreased.[22] Trends in income distribution can be observed more clearly by looking at the rental/wage ratio.[23] They follow in the short run a path consistent with the Heckscher-Ohlin model: in labour-scarce, land-abundant countries, immigration pushes real wages down, while the increasing labour/land ratio pushes land prices up[24]. As mentioned, in the long run other variables must have played a more

significant role in setting real wages than compensatory factor movements, since no convergence is observed.

Lets us briefly recall the main stylised facts that emerge from the real wages series:

(i) real wages and GDP per capita convergence go hand by hand;

(ii) real wages convergence occurred with respect to some countries in certain periods. This is the case of Australia with respect to Europe and the Latin European economies with respect to Argentina. In these cases traditional globalisation forces worked effectively for reducing international real wages asymmetries;

(iii) in the long run the evidence suggests that real wages convergence cannot be considered a stylised fact of the international economy– a conclusion that confirms what has already been observed for GDP per capita convergence. There never was convergence with respect to the USA and, since the 1950s, the River Plate and New Zealand fell behind.

We so far did not explore in this paper why there was no wage convergence. In the theoretical review it was suggested that the lack of convergence in terms of productivity growth, along with no fully compensatory movements of factor and goods prices, were a good guess. In other words, conventional static HOS effects could have been dominated by technology-driven productivity effects. In the next section, a preliminary econometric test on real wages convergence is presented in which both globalisation and productivity variables are included.

3. A PRELIMINARY EXPLORATION OF THE DETERMINANTS OF REAL WAGES

AUSTRALIA AND CANADA

While Williamson concentrates in wage dispersion between Old and New Countries, GMO compare two New World countries: Australia and Canada. In order to include the effect of globalisation forces, they used the terms of trade and the immigration rate. In order to get the effect of "national forces", they considered productivity growth, using GDP per capita and the investment rate as proxies. Their findings can be summarised as follows:

(i) in the case of Canada, the terms of trade affect real wages in various contradictory ways which cancel out. Productivity, on the contrary, seemed to have an important impact on real wages;

(ii) in the case of Australia, terms of trade and immigration did not play any significant role in explaining real wages. The authors conclude that productivity growth is the main explanatory factor to real wage movements, although the point could not be rigorously proved because of lack of data;

(iii) Pope and Withers series show that Australian real wages grew modestly stronger than GDP per capita (at variance with Williamson´s results). This effect is related to an increase in the employment of skilled workers as compared to unskilled workers;

(iv) the main explanation to why Australian real wages could not catch up with Canadians was the predominance of English standards in Australia and the proximity of Canada to the American economy, which would become the leading industrial nation;

(v) while immigration had a negative impact on wages in Canada, the small size of the economy, the existence of economies of scale, an expanding frontier and the protection of distance and tariffs may explain the modest but positive relation between immigration and real wages in Australia.[25]

URUGUAY: A PRELIMINARY ECONOMETRIC 1870-1913

This section presents a preliminary analysis of the determinants of real wages based on the GMO model. The model includes (a) real wages as the dependent variable and (b) GDP per capita (as a proxy for productivity), terms of trade and immigration (as a proxy for conventional HOS forces) as independent variables. The sign of the coefficients for GDP per capita and terms of trade are expected to be positive. In the case of immigration, the sign is undetermined and depends on the relative importance of increasing returns.

As it is mandatory in time series work, we began by testing for unit roots. ADF unit root tests suggest that all series are I(1) – *i.e.* they have an unit root and are first-difference stationary (see Table I). As a result, we tested for a long run equilibrium relationship using the Joahansen cointegration procedure. We did not find any cointegrating vector among the variables of the model (not reported). To the extent that we have a very small number of observations (28) we must take this result *cum grano salis*.

We moved to test a different model (in this case we could look at a longer period, 1870-1913), assuming that only productivity holds a long run relationship with real wages while terms of trade and immigration cause just transitory shocks. The dynamic model tested was the following:

$$A(L)w = B(L)y + ut$$

where w are real wages, y is GDP per capita, ut is a white noise, and A and B are polynomial lag operators – *i.e.*, $A(L) = 1\text{-}a1L - a2L^2 \text{-}...apL^p$. The sum of the estimated "a_i" (where i = 1...p) must be less than one for the model to converge to the long run solution. This allows for a t-type test for unit roots (which is produced by the *PCGive* output), providing an alternative test for cointegration. The results can be found in table II. First, the variables cointegrated and the real wage elasticity to productivity (GDP per capita) was about 0.5. The model passes the summary *PCGive* test, although the hypothesis of normality was too close to rejection.

Our econometric analysis confirms what was reported by GMO, namely that productivity played the leading part in the shaping of real wages in the long run. It should be observed that real wages were inelastic to GDP per capita, suggesting that income distribution worsened in the period considered. To this immigration must have contributed, giving support to the idea that in the short run HOS forces did work.

In order to test for this hypothesis, we set forth a simple econometric model for addressing the influence of HOS-type effects upon income distribution. We run a regression between the land rental / wage ratio and the land / labour ratio, the latter being a proxy for the relative abundance of factors. We also included the terms of trade in the regression as they may have an independent influence on the rental/wage ratio. Table III sows that as expected the rental/wage ratio increased as the

land/labour ratio decreased. In addition, the positive sign of the variable terms of trade suggests that landed capitalists managed to absorb a higher percentage of the positive shocks in the terms of trade as compared to labour.

4. CONCLUDING REMARKS

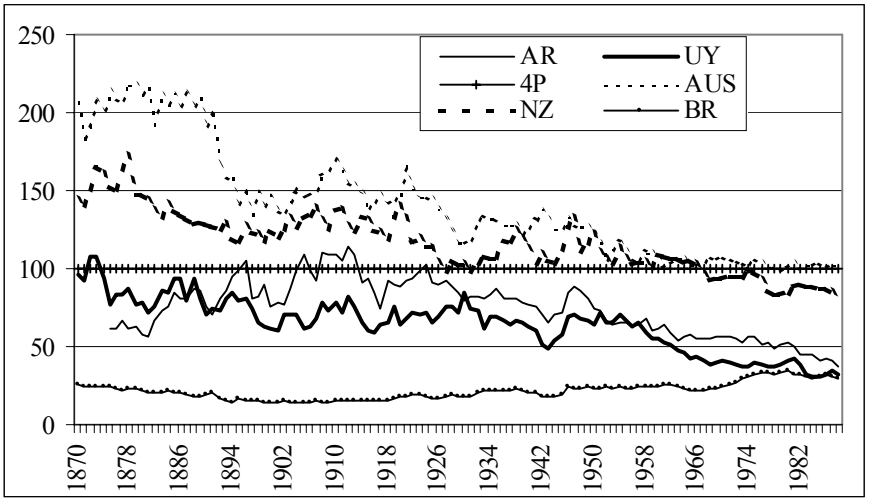
This paper analysed whether there is evidence for both GDP per capita convergence and real wages convergence, comparing the River Pate and the Australasian countries with respect to a group of four developed countries. The relevance of the question is related to the old debate over the alleged failure of the River Plate to develop when compared to Australasia, in spite of featuring similar endowments and potentialities. In addition, it is also relevant in relation to whether factor prices convergence is found in the international economy (at variance with the failure to find GDP per capita convergence).

We found no clear-cut evidence in favour of either a Solow-type path of convergence nor a HOS-type of factor prices equalisation. On the contrary, the dynamics of productivity seemed to dominate in the long run (as predicted by NGT models) . However, HOS forces seemed to have been important in certain periods, as proposed by the conventional theory, in affecting the pattern of income distribution.

In addition, we found certain unexpected similarities in the growth path of the two type of countries (River Plate and Australasia) which contradicts the general view about the existence of two very different paths. While Argentina and Uruguay showed strongly fluctuating patterns of productivity growth when compared to the European core countries, differences in relation to Australia and New Zealand appear to be fairly constant in terms of a percentage of the core countries per capita GDP. This again urges to look at closer range to the role of specialisation and technological learning as determinants of economic and real wages growth in the long run.

The paper must be seen as a preliminary exploration designed to define more clearly the stylised facts that theory should explain and the nature of the problems to be addressed. A lot of comparative institutional and historical analysis is required to explain the observed patterns. National differences in how income and wealth are distribute, and in how technology is absorbed and diffused, are decisive in order to explain real wage levels and growth rates. Hopefully, the interaction between scholars from different countries and with different approaches to the problem will allow to make progress in that direction.

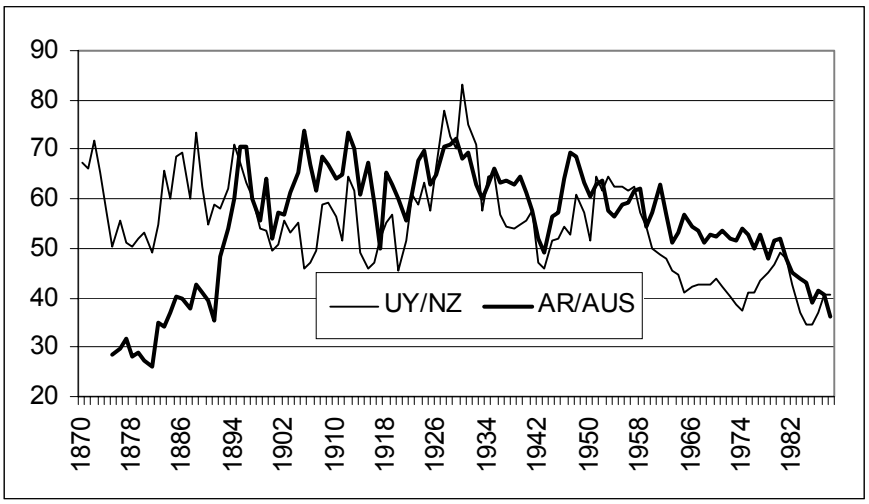
Graph 1. Austral-Asian and Southern Cone per capita GDP relative to that of four core countries, 1870-1988 (four core countries =100)



Sources:

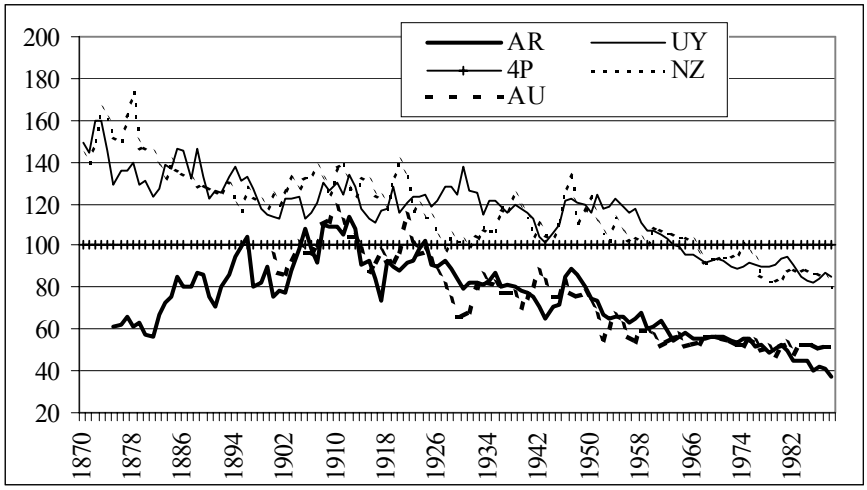
Argentina, Brazil, Uruguay and four core countries (France, Germany, UK and USA): Bértola, L. & Porcile, G., *Argentina, Brazil, Uruguay and the World Economy...*, Statistical Appendix.
Australia and New Zealand: 1950-1988, Penn World Table; 1870-1950, Maddison *L'Économie Mondiale 1820-1992.*

Graph 2. Relative per capita GDP growth between Argentina and Australia and between Uruguay and New Zealand (Australia and New Zealand=100)



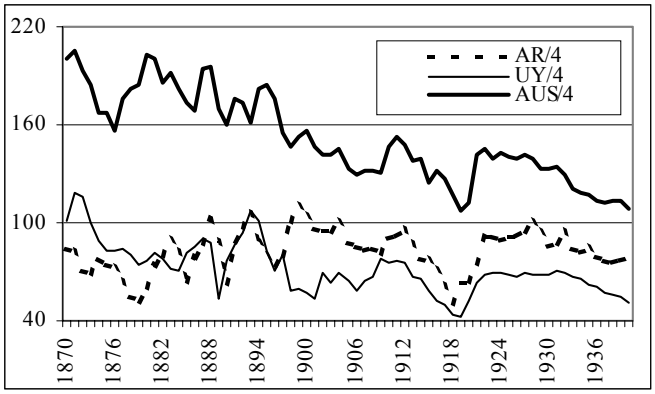
Sources: As in Graph 1.

Graph 3. Argentina and Australia, New Zealand and Uruguay: per capita GDP relative to that of four core countries, controlled by average differences, 1870-1988 (four core countries=100).



Comments: the average percentual difference between Australia and Argentina was added to Argentina and the average percentual difference between New Zealand and Uruguay was deduced from New Zealand.

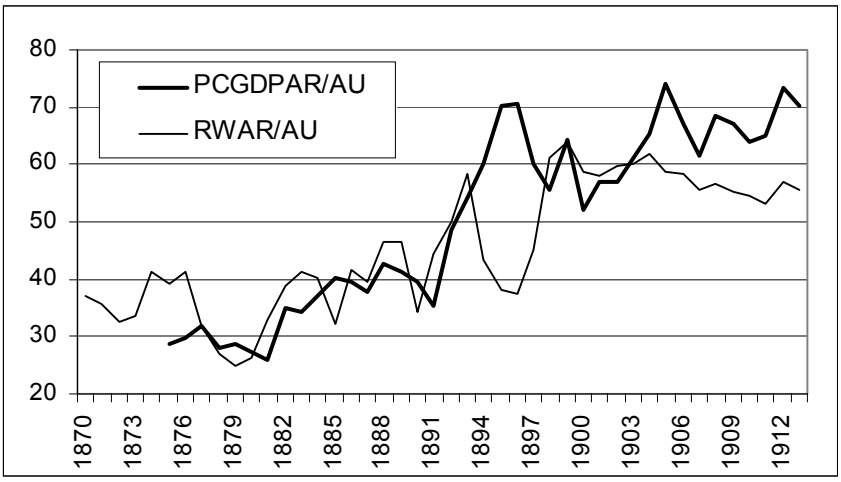
Graph 4. Argentine, Australian and Uruguayan real wages relative to those of four core countries, 1870-1940 (four core countries=100)



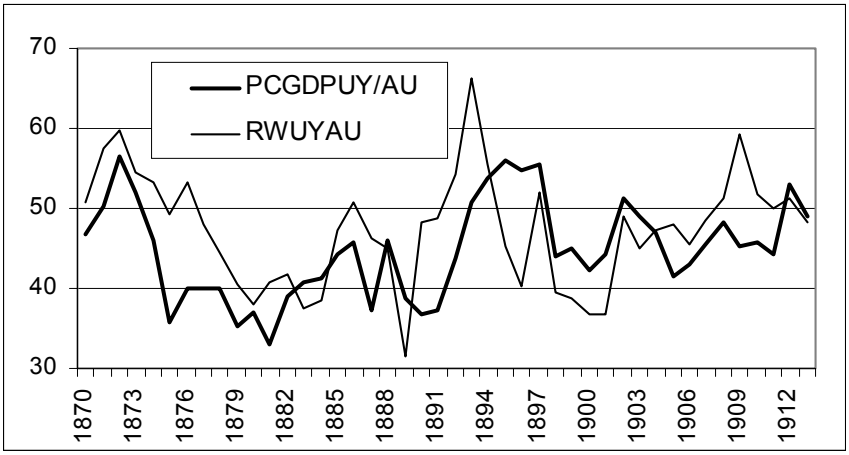
Sources:

Argentine and Uruguayan real wages and benchmarks: Bértola, L., Camou, M. & Porcile, G., "Comparación Internacional del Poder Adquisitivo de los Salarios Reales".
Four core countries' real wages and benchmarks, Williamson, J., "The Evolution of Global Labor Markets Since 1830".
Australian real wages, Williamson, J., "The Evolution of Global Labor Markets Since 1830".
Australian benchmark, Greasley, D., Madsden, J.B. & Oxley, L., "Real wages in Australia and Canada, 1870-1913".

Graph 5. Argentine and Australian per capita GDP and real wages, 1870-1913 (Australia=100)



Graph 6. Uruguayan and Australian per capita GDP and real wages, 1870-1913 (Australia=100)



Graph 7. Argentina, Australia and Uruguay: real wage/per capita GDP ratio, 1870-1913 (1913=100)

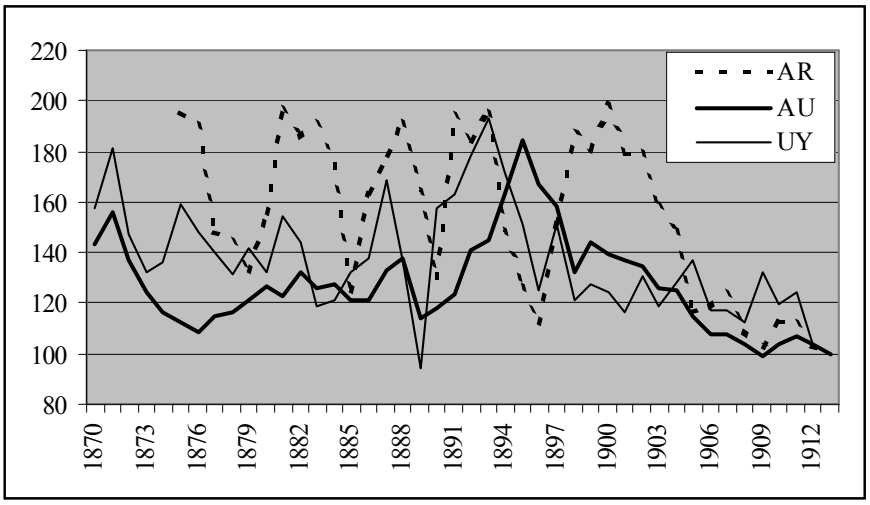


Table I. Unit root tests 1888 to 1913 and 1874-1913

Unit root tests 1889 to 1913

Critical values: 5%=-1.955 1%=-2.66

	t-adf	s	lag	t-lag	t-prob
LSALDO_M	-0.71798	0.40634	2	-0.059977	0.9527
LSALDO_M	-0.83702	0.39744	1	-2.3207	0.0295
LSALDO_M	-2.2953*	0.43223	0		
LSALARIO	-0.21363	0.17654	2	-0.38923	0.7009
LSALARIO	-0.22382	0.17325	1	-1.4693	0.1553
LSALARIO	-0.22872	0.17739	0		
LTerms_o	1.1326	0.10176	2	-2.0057	0.0573
LTerms_o	0.82598	0.10824	1	-0.36208	0.7206
LTerms_o	0.79777	0.10626	0		
LPBI/PC	0.66730	0.081578	2	-0.17864	0.8599
LPBI/PC	0.66393	0.079843	1	-0.96740	0.3434
LPBI/PC	0.46455	0.079736	0		
DLSALDO_	-3.2730**	0.41102	2	0.073860	0.9418
DLSALDO_	-4.6064**	0.40203	1	0.40218	0.6913

DLSALDO_	-9.2438**	0.39495	0		
DLSALARI	-3.1105**	0.17671	2	0.055232	0.9565
DLSALARI	-4.1706**	0.17284	1	0.40097	0.6921
DLSALARI	-6.5978**	0.16979	0		
DLTerms_	-3.5020**	0.10459	2	0.19407	0.8479
DLTerms_	-4.9478**	0.10238	1	1.8626	0.0753
DLTerms_	-5.0042**	0.10752	0		
DLPBI/PC	-2.9984**	0.082351	2	0.16175	0.8730
DLPBI/PC	-3.8017**	0.080588	1	0.095393	0.9248
DLPBI/PC	-6.2967**	0.078907	0		

Unit root tests 1874 to 1913

Critical values: 5%=-1.949 1%=-2.621

	t-adf	s	lag	t-lag	t-prob
LSALARIO	-0.13609	0.14446	2	-0.31466	0.7548
LSALARIO	-0.13643	0.14274	1	-1.5092	0.1395
LSALARIO	-0.13966	0.14506	0		
LTerms_o	1.8117	0.085390	2	-2.1228	0.0405
LTerms_o	1.4079	0.089243	1	-0.54524	0.5888
LTerms_o	1.3397	0.088436	0		
LPBI/PC	0.56278	0.091535	2	-0.61639	0.5414
LPBI/PC	0.50115	0.090786	1	-1.4351	0.1594
LPBI/PC	0.36349	0.092010	0		
DLSALARI	-3.9832**	0.14444	2	0.16793	0.8676
DLSALARI	-5.1275**	0.14259	1	0.31824	0.7520
DLSALARI	-7.9820**	0.14093	0		
DLTerms_	-4.3307**	0.089029	2	0.23825	0.8130
DLTerms_	-5.8155**	0.087917	1	1.7880	0.0817
DLTerms_	-6.3580**	0.090360	0		
DLPBI/PC	-4.6519**	0.091058	2	0.84223	0.4051
DLPBI/PC	-5.3492**	0.090709	1	0.56209	0.5774
DLPBI/PC	-7.7781**	0.089910	0		

Key for the variables

LSALARIO: log of real wages

LTerms_o: log of terms of trade

LPBI/PC : log of real GDP per capita

LSALDO_M: net immigration

dum 1898: dummy equals 1 for the years 1898-1891, zero otherwise

dum 1904: dummy equals 1 for the year 1904, zero otherwise

dum war I: dummy equals 1 for the years 1914-18, zero otherwise

Note, the letter D indicates first-differences of the variables

Table II. Long Run Equation: Real wages and Productivity

```
The present sample is:  1873 to 1913

 Variable     Coefficient    Std.Error  t-value  t-prob  PartR2
 Constant          1.2944      0.80250    1.613  0.1155  0.0674
 LSALARIO_1       0.48076      0.14809    3.246  0.0025  0.2265
 LPBI/PC          0.41768      0.22803    1.832  0.0753  0.0853
 LPBI/PC_1       -0.43402      0.27892   -1.556  0.1284  0.0630
 LPBI/PC_2        0.27008      0.23873    1.131  0.2654  0.0343

 R2 = 0.395817  F(4, 36) = 5.8961 [0.0009]  s = 0.124051  DW = 1.92
 RSS = 0.5539889634 for 5 variables and 41 observations


 AR 1- 2F( 2, 34) =    0.78198 [0.4656]
 ARCH 1 F( 1, 34) =     2.2487 [0.1430]
 Normality Chi2(2)=     5.0457 [0.0802]
 Xi2    F( 8, 27) =    0.63878 [0.7384]
 Xi*Xj  F(14, 21) =     1.1515 [0.3749]
 RESET  F( 1, 35) =     1.3098 [0.2602]
 Solved Static Long Run equation
     LSALARIO =    +2.493              +0.4887 LPBI/PC
 (SE)          (    1.415)          (   0.3294)

 WALD test Chi2(1) = 2.2008 [0.1379]
```

Tests on the significance of each variable

variable	F(num,denom)	Value	Probability	Unit Root t-test
LSALARIO	F(1, 36) =	10.54	[0.0025] **	-3.5063*
Constant	F(1, 36) =	2.6018	[0.1155]	1.613
LPBI/PC	F(3, 36) =	1.8192	[0.1611]	1.3382

Tests on the significance of each lag

Lag	F(num,denom)	Value	Probability
1	F(2, 36) =	5.6203	[0.0075] **
2	F(1, 36) =	1.2798	[0.2654]

Tests on the significance of all lags up to 2

Lag	F(num,denom)	Value	Probability
1- 2	F(3, 36) =	3.8388	[0.0175] *
2- 2	F(1, 36) =	1.2798	[0.2654]

Table III: Income Distribution in a HOS Framework

Solved Static Long Run equation

Lrw =	+11.25	-1.684 Lland/l	+0.1426 LTerms
(SE)	(7.932)	(0.6618)	(1.172)

WALD test Chi2(2) = 30.473 [0.0000] **

Sumamry Test

AR 1- 2	F(2, 29) =	0.79948 [0.4592]
ARCH 1	F(1, 29) =	0.34347 [0.5624]
Normality	Chi2(2)=	11.587 [0.0030] **
Xi2	F(16, 14) =	1.7454 [0.1506]
RESET	F(1, 30) =	0.12517 [0.7260]

Lrw= log rental-wage ratio

Lland/l = log land-labour ratio

Lterms = log of terms of trade

BIBLIOGRAPHY

Aghion, P. and Howitt, P. *Endogenous growth theory*. MIT Press 1998.

Aghion, P. and Williamson, J. *Growth, inequality and globalization*. Cambridge University Press, 1998.

Arthur, B. *Incerasing returns and path-dependency in the economy*. The University of Michigan Press, 1994.

Baldwin, R.E.; Martin, P. and Ottaviano, G.I. "Global income divergence, trade and industrialization: the geography of growth take-offs", NBER Working Paper 6458, march 1998.

Bértola, L., & Porcile, G., "Argentina, Brazil, Uruguay and the World Economy: an approach to different convergence and divergence regimes", paper presented at the XII International Economic History Congress, Madrid, August 1998, DT 42, Unidad Multidisciplinaria, Facultad de Ciencias Sociales, Montevideo, 1998.

Bértola, L., Camou, M. & Porcile, G., "Comparación Internacional del Poder Adquisitivo de los Salarios Reales de los Países del Cono Sur, 1870-1945", paper presented to the Session "Mercado de trabajo y nivel de vida", Segundas Jornadas de Historia Económica, Montevideo, july 1999.

Bértola, L., *Ensayos de Historia Económica: Uruguay y la región en la economía mundial 1870-1990*, Trilce, Montevideo 2000.

Bértola, L., "Income Distribution and the Kuznets Curve: Argentina and Uruguay since the 1870s", paper presented to the Second Latin American Cliometric Society's Conference, Stanford University, November 2000.

Dennon, D. *Stter capitalism: the dynamics of dependent development in the Southern hemisphery*. Oxford: Clarendon University Press, 1983.

Durlauff, S.N and Quah, D. "The New Empirics of Economic Growth", Working Paper, Santa Fe Institute Economics Research Program, January 1998.

Dyster, B. & Meredith*, D., Australia in the International Economy*. Cambridge University Press, 1990.

Greasley, D., Madsden, J.B. & Oxley, L., "Real wages in Australia and Canada, 1870-1913: globalization versus productivity". *Australian Economic History Review*, 2/2000, 178-198.

Maddison, A., *L'Économie Mondiale 1820-1992. Analyse et statistiques*. OCDE 1995.

McCombie, S. and Thirlwall, A. *Economic growth and the balance of payments constraint*. New York, St Martin´s Press, 1994.

Nelson, R. and Winter, S. *An evolutionary theory of economic change*. Harvard U. Press, 1982.

Platt, D.C. and di Tella, G. (eds) *Argentina, Australia and Canada: Studies in comparative development 1870-1965*. New York: St Martin´s Press, 1985.

Ros, J. *Development theory and the economics of growth.*The University of Michigan Press, 2000.

Setterfield, M. "History versus Equilibrium and the Theory of Economic Growth", *Cambridge Journal of Economics*, 21, pp.365-378, 1997.

Taylor, L. *Income distribution, inflation and growth.* MIT Press, 1991.

Romer, D. *Advanced Macroeconomics*. New York: McGraw Hill, 1996.

Williamson, J., "The Evolution of Global Labor Markets Since 1830: Background Evidence and Hypothesis", *Explorations in Economic History*, 3/95.

Williamson, J., "Real Wages and Relative Factor Prices in the Third World 1820-1940: Latin America", Harvard Institute of Economic Research, Discussion Paper Number 1853, November 1998.

NOTAS:

[1] See for instance Dennon (1983) and Platt and Di Tella (1989).

[2] We use the label NGT to refer to both the neoclassical growth theory revival and to evolutionary growth models largely inspired by Nelson and Winter ´s classical work (Nelson and Winter, 1982).

[3] Many of the insights are indeed old ideas formalised in new ways.

[4] In other words, increasing returns produce differences in productivity growth among countries. It is unlikely that factor movements could change the price of factors and goods in the degree required for compensating the influence of increasing returns. In particular, increasing returns are associated with oligopoly and therefore less price flexibility in the goods market.

[5] Cf. Aghion and Howitt (1998).

[6] See also on this point Setterfield (1997).

[7] The authors suggest (but not explore in the paper) the possibility of a fourth phase in which income convergence occurs, based on a reduction of the cost of transferring knowledge across countries.

[8] It is also possible to show that during the transitional dynamics the land-poor country grows at higher rates than the land-rich country.

[9] In other words, If migration depresses real wages by expanding labour supply in the short run, it may boost productivity and higher real wages in the long run when the production function exhibits increasing returns.

[10] See Taylor (1994), pp. 197-201.

[11] Bértola and Porcile (1998).

[12] More on lock-in and increasing returns shaping long run growth can be found in Arthur (1994, chapter 8).

[13] With exogenous exports (X) there is an unique value of income (Y) consistent with balance of payments equilibrium given by $Y = X/m$, where m is the income elasticity of the demands for imports. As $L = F^{-1}(Y)$ and Y is fixed (assuming a production function such as $Y = F(L)$), the labour demand curve (in the real wage-employment space) is vertical (Romer, 1996, p.221).

[14] This point is developed further in Bértola and Porcile (1998).

[15] See for example, Williamson, J., "The Evolution of Global Labor Markets Since 1830...", Williamson, J., "Real Wages and Relative Factor Prices in the Third World 1820-1940".

[16] These series were incorporated to Williamson´s database.

[17] The Australian real wages series available to us are those reproduced by Williamson, based on non-qualified labour. In the Williamson series real wages performed worse than in the more representative series of Pope and Withers. GMO also point out that Williamson estimates have a downward bias for the Australian benchmark. See Greasley, D., Madsden, J.B. & Oxley, L., "Real wages in Australia and Canada, 1870-1913".

[18] See also Bértola, L (2000) chapter 4.

[19] Bértola, L., Camou, M. & Porcile, G (1999). The fact that GDP per capita convergence and real wages converge move together suggests that the conclusions about the relation between GDP convergence and openness, presented in Bertola and Porcile (1998), could be extended to the relation between real wages convergence and openness. These conclusions are as follows: (i) real wages convergence could not always be found in periods of openness; (ii) real wage divergence was not always associated with periods of higher industrial protection.

[20] Greasley, D., Madsden, J.B. & Oxley, L. (2000) pp. 184-185. Unfortunately we do not have real wages data for New Zealand

[21] Exports according to Butlin, N.G., *Australian domestic product...* and terms of trade according to Bambrick, "Australia's long-run terms of trade", both in Dyster, B. & Meredith, D. (1990) tables 2.7 and 3.1 and figure 3.1, respectively.

[22] Immigration rates according to Wilcox, *International Migrationsquoted* quoted in Dyster, B. & Meredith,, D. (1990), p.21. .

[23] Bértola, L., "Income Distribution and the Kuznets Curve: Argentina and Uruguay since the 1870s".

[24] Bértola, L (2000), chapter 4.

[25] Greasley, D., Madsden, J.B. & Oxley, L., "Real wages in Australia and Canada, 1870-1913".