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Abstract

In this paper we do a couple of things: discussing a way to measure the welfare cost of country risk, and measuring it for Argentina in the period 1875-2006. There are two conclusions: a) the welfare cost of Argentine risk has been huge: for example, in the period 1976-2006 it was around 20% of GDP, several times larger than the welfare cost of any conventional distortion; b) this cost would be wholly paid by labor. These fascinating results deserve further investigation.

Resumen

Este artículo tiene dos objetivos: discutir una forma de medir el costo de bienestar del riesgo-país, y medirlo para Argentina en el período 1875-2006. Arribamos a dos conclusiones: a) el costo de bienestar del riesgo-argentino ha sido enorme: por ejemplo, en el período 1976-2006 fue alrededor de 20% del PBI, varias veces mayor que el costo de bienestar de cualquier distorsión convencional; b) este costo sería pagado en un 100% por el factor trabajo. Estos fascinantes resultados merecen más investigación.

JEL: D63, D82, O12, O16
Key words: country risk, welfare cost, growth, Argentina.

[1] The ideas explored in this paper go back to Avila (1999). I am grateful for comments made by J. Streb and other members of the Economics Seminar at UCEMA. The viewpoints are personal and do not necessarily represent the position of the Universidad del Cema.

Introduction

The big issue regarding the Argentine economy is her quick growth in the late 19th century and her long decline for most of the 20th century. Many authors have written on this matter. Cortés Conde (1997) explains persuasively the 19th century miracle. He argues that the end of the civil wars provided the political and legal stability the country badly needed to assert property rights and cut transaction costs, adding that this achievement was the factor behind the huge inflows of capital and labor that built modern Argentina. Sturzenegger (1984) and Cavallo (1984) provide a suggestive explanation for the 20th century decline. Since the Argentine economy has been a mixed economy for most of the last century, Sturzenegger argues that its capitalist sector did not have real markets while the socialist sector did not have central planning; he adds that policy-induced distortions worsened conditions such as competition, appropriability, and certainty that are required for markets to work efficiently, while political instability worsened conditions for planning where markets fail. Cavallo, in turn, stresses the impact on the rate of growth of some static distortions (taxes, regulations, and trade barriers). He may be right in a certain sense: even when a static distortion yields a once-and-for-all reduction in the level of national income, a crescendo of static distortions may yield a long-run sequence of national income reductions that looks like a reduction in the rate of economic growth.

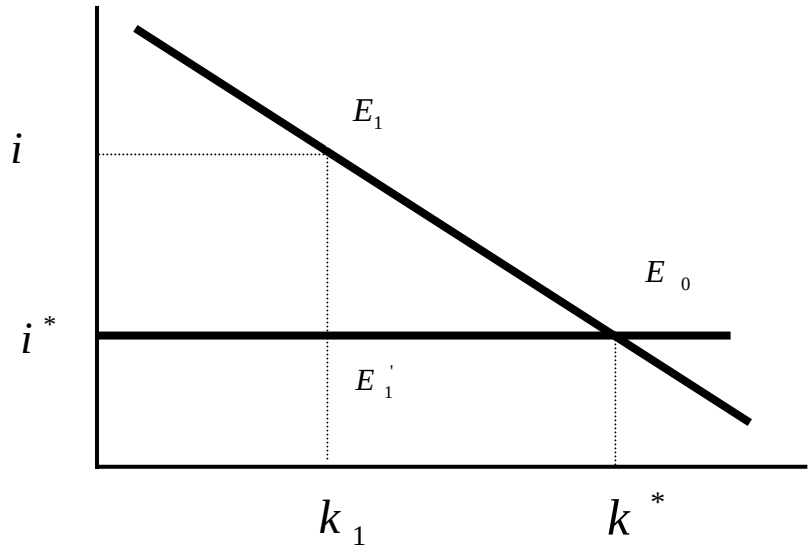
Later on, we developed a country-risk approach to explain the 19th century miracle, the 20th century decline, as well as the business cycle in Argentina (Avila 2008, 2010, 2011). Based on empirical evidence, we find this approach compelling. The task of this paper is to investigate the welfare cost of the Argentine risk. As far as we know, there are no previous studies on this issue.

Section I deals with the concept of country risk. Section II makes focus on a specific equation to calculate the cost of Argentine risk. Section III measures it for the period 1875-2006. Section IV argues that labor pays the whole welfare cost of country risk under standard assumptions. Section V summarizes our findings.

I. Country risk as special tax

Investment is a gamble whose outcome we know as time goes by. Therefore, the right place to study the effect of country risk is the economy's intertemporal market. Figure 1 shows the impact of the country-risk premium on the capital market of a country that is open to international capital flows. On the vertical axis, we measure the marginal yield on capital per worker; on the horizontal axis, the capital per worker that has been sunk in the country. Without country risk, equilibrium takes place at point E_0, where the domestic interest rate i equals the foreign interest rate i^*, and capital per local worker k equals capital per worker in the group of leading countries k^*. A social optimum obtains when investment in the country is not penalized by country risk. (We speak of a social optimum because this kind of uncertainty does not come from foreign but from domestic sources; country risk is a self-inflicted cost, stemming from frequent and sudden changes in economic policy.) With country risk, the premium filters into the capital market opening a wedge between the marginal yield on capital i and the marginal compensation for savers i^*. From a social point of view, the optimum requires $k=k^*$, while from the private point of view it requires $k = k_1 \leq k^*$. The country-risk premium $\rho = i - i^*$ works like a tax collected by investors to provide against imponderables.

Figure 1: The Country-Risk Tax



On the one hand, the country-risk premium creates a distortion with a welfare cost that takes the shape of triangle $E_0E_1E_1^{'}$ in figure 1. As the premium rises, the triangle gets bigger because the productivity of sunken capital increasingly exceeds the opportunity cost of the resource. On the other, it generates the rectangle $iE_1E_1^{'}i^*$, analogous to that representing the revenue of a conventional tax. Yet this time it measures the economic cost of anxiety and partial insurance that investors find hard to avoid in the face of country risk. Unlike a conventional tax, whose revenues go straight to the Treasury, the country-risk rectangle stands for a social cost because it represents a drain on resources that benefits no-one.[2] So the welfare cost of country risk is equal to:

$$1)\ WCCR = \frac{1}{2}(i - i^*)(k^* - k_1) + (i - i^*)k_1$$

The right-hand side of the equation has two terms: the first measures the triangle and the second, the rectangle. The triangle is equal to half the country-risk premium over the gap in capital per worker that separates the lagging country from the leading group. The rectangle is equal to the country-risk premium over the country's sunken capital per worker.

II. An equation to measure the welfare cost

To calculate WCCR we need a specific formulation for equation 1. We begin by assuming an economy with a constant-returns-to-scale production function:

$$2)\ Y = K^{\alpha}(LA)^{1-\alpha}$$

Output or income *Y* results from combining the services of capital *K* and labor *L* resources. Parameters α and *A* stand for output elasticity of capital and an index of labor-augmenting technological progress, respectively. With perfect competition, α also represents the share of capital in output (1-α represents the share of labor). Equation 2, in turn, can be written in this way:

[2] Regarding trade barriers, Krueger (1984, p. 544) writes that "rent-seeking converts much or all of the rectangle from transfer payments to a deadweight loss." This reference helps to understand that the rectangle not always is just a transfer without economic loss.

3) $y = A^{1-\alpha} k^{\alpha}$

As an aside, it is interesting to write equation 3 in the following fashion:

3') $\frac{K}{Y} = \left(\frac{k}{A} \right)^{1-\alpha}$

It helps to make consistent two empirical regularities: a capital-labor ratio that rises through time with a capital-output ratio that stays rather constant (Romer 1989). Labor-augmenting technological progress (a higher A) leads to proportionally higher capital-labor ratio in the right-hand side of equation 3', thus leaving constant the capital-output ratio.

4) $MPK = \frac{\alpha A^{1-\alpha}}{k^{1-\alpha}} = i$

Equation 4 says that the marginal product of capital must equal the domestic interest rate, gross of country risk and technical depreciation.

5) $i^* = \frac{\alpha A^{1-\alpha}}{(k^*)^{1-\alpha}} = 0.07$

Equation 5 says that the marginal product of capital in the leading countries must equal the foreign (risk free) interest rate, gross of technical depreciation. We set the latter at 7% per year. Plugging equation 5 into equation 4 we get equation 6.

6) $i = 0.07 \left(\frac{k^*}{k} \right)^{1-\alpha}$

According to this equation, the domestic interest rate depends on the ratio between capital per worker in the leading group and local capital per worker. Plugging now equations 6 and 5 into equation 1, we get a specific equation for WCCR:

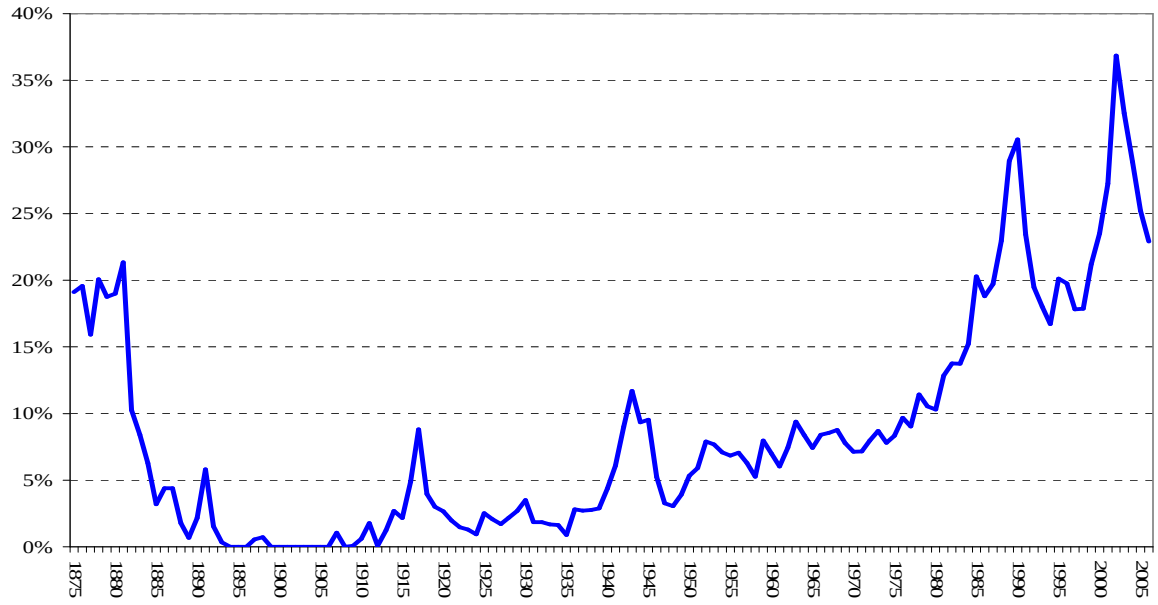
7) $WCCR = \frac{1}{2} 0.07 \left[\left(0.9 \frac{k^*}{k} \right)^{1-\alpha} - 1 \right] (0.9k^* - k) + 0.07 \left[\left(0.9 \frac{k^*}{k} \right)^{1-\alpha} - 1 \right] k$

If the country-risk premium falls to zero, the capital per worker for the lagging country may converge on the capital per worker for the leading group or just on a fraction of it. Equation 7 assumes that capital per worker for the former stops growing at 90% of capital per worker for the latter. Static distortions (barriers to trade, market regulations, state-run enterprises, an inefficient tax system), poor natural resources, a small domestic market, and a distant location from large foreign markets help to explain the lack of full convergence.

III. The measurement of the welfare cost

If we now apply equation 7 to the data on capital per worker in the Appendix, we get figure 2. It shows that the evolution of WCCR has been extraordinary in Argentina. In the period 1895-1905 it was nill; in the period 1915-40 it was about 2.7% of per-capita income; in the period 1940-75 it averaged 7.2%, while for the period 1976-2006 it fluctuated largely with a mean value of 20.0%.

Figure 2: Welfare Cost of Argentine Risk, 1875-2006
As a percentage of GDP per capita



Our estimation rests on the following simplifying assumptions:

- $k=3y$, throughout the period 1875-2006 for the leading group and Argentina (Romer 1989 for the leading group and Coremberg et al 2007 for Argentina since the mid 1970s).

- $k=0.9k^*$, as discussed in the above paragraph.
- $\alpha = 0.4$. For developed countries in the period 1947-1990, capital share in income fluctuated between 0.38 and 0.45, while for Latin American countries in the period 1940-80 it fluctuated between 0.45 and 0.69 (Barro and Xala-i-Martín 1995, table 10.8, p. 380-81).
- i^*=7% per year. Gravelle (2005) suggests this figure for the rental price of capital in the USA. We can arrive at roughly the same number by figuring out the World real-interest rate and the rate of technical depreciation. The first component of the rental price of capital is generally set at 3% per year. A reasonable figure for the second component is 4% per year. Nehru and Dhareshwar (1993) estimate this number for developed countries. On the basis of estimates for the Argentine capital stock by the Dirección Nacional de Análisis y Planificación Global (1991), we arrive to a similar figure for the rate of capital decay.
- Residents save in foreign bonds, earning i^* minus the rate of technical depreciation.

Table 1 provides some sensitivity analysis. For the period 1976-2006, the welfare cost of Argentine risk rises to 25.3% of GDP if we assume full convergence; alternatively, the cost falls to 14% if we assume a share of capital in income closer to that observed for Latin American countries (Barro and Xala-i-Martín 1995).

Table 1: Welfare Cost of Argentine Risk, 1976-2006
As a percentage of GDP per capita

	$k=0,9.k^*$	$k=k^*$
α **=0,40**	20,0%	25,3%
α **=0,55**	14,0%	17,6%

These results also depend critically on the rate of technical depreciation and the capital-output ratio. Our assumptions look well founded on the former so we will not introduce any change in this respect. In spite of feeling less confident on the latter, we will stick to the

above estimates of the welfare cost for two reasons: a) According to Nehru and Dhareshwar (1993), for the period 1976-2006 it seems appropriate to set the capital-output ratio for the leading group and Latin America at 3; Coremberg et al (2007) calculate basically the same ratio for Argentina in such period; b) Nehru and Dhareshwar (ibid) calculate that the ratio rose from 2.2 in 1960 to 2.5 in 1973 for the high-income countries, and from 2.0 to 2.1 between the same years for the Latin American countries. Yet if we estimate the welfare cost of Argentine risk for the period 1940-75 with these ratios we would find very little change: 7.0% of GDP instead of the previous 7.2% (for k=0.9k* and $\alpha = 0.4$).

Some measures of the welfare cost of conventional distortions should be considered to put our measures into perspective. Harberger (1974) estimates the efficiency loss due to the monopolization of U.S. manufacturing sector at 0.1% of GDP. Bergsman (1974) estimates the welfare cost of tariff and non-tariff protection in Brazil at 0.3% of GDP; he points out that this cost rises to an exceptional level of 7.1% after taking into account the losses for X-efficiency and the monopolization of markets induced by protection itself. Fernández and Rodríguez (1980) estimate a welfare loss related to the Argentine state telephone monopoly at 1.5% of GDP for the year 1980.

IV. Labor pays the cost

As we know, the assumptions of a constant-returns-to-scale production function and perfect competition in the product and factors markets let's conclude that payments to workers and capitalists exhaust income. This is the message of equation 8.

8) $Y=MPK.K+MPL.L$

If we now assume that the lagging country enjoys perfect access to World capital markets at the foreign interest rate plus the country-risk premium, we get to a startling conclusion: the WCCR would be wholly paid by the workers.

9) $Y = (i^* + \rho)K + w.L$ (Where w stands for the wage rate.)

Since payments to capitalists must equal the sum of the foreign interest rate and the country risk premium so that sinking capital in the country remains attractive, labor, the immobile factor of production, has no alternative but paying the cost of country risk. Figure 1 makes

clear this conclusion. Without country risk, the area below the demand curve for capital and above the foreign interest rate represents payments to labor. With country risk, the triangle and the rectangle represent foregone payments to labor. Potential payments involved in the triangle may be seen as wealth thrown away to the sea. Potential payments involved in the rectangle may be seen as the premium that investors pay to a hypothetical international firm providing insurance against macroeconomic and institutional instability.

V. Concluding Remarks

The welfare cost of Argentine-risk seems large, much larger than the welfare cost estimated for trade tariffs and monopolies in well-known studies. Under standard assumptions on the production function, the organization of markets for product and factors of production, and investors' access to World capital markets, we conclude that labor would end up paying the whole cost of country risk. These fascinating yet daring conclusions deserve more research.

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Appendix

Per Capita Capital Stocks for Argentina and the Anglo-Saxon Group (USA, Great Britain, Australia and Canada); Triangle, Rectangle and Total Costs as fractions of per Capita GDP, period: 1875-2006.

	Argentina	Anglo-Saxon Group	Triangle Cost	Rectangle Cost	Total Cost
	Per capita capital stock		Fraction of per capita GDP		
1875	2816	6703	0,069	0,122	0,191
1876	2743	6597	0,072	0,124	0,196
1877	3007	6627	0,052	0,107	0,159
1878	2801	6808	0,075	0,126	0,201
1879	2929	6913	0,067	0,120	0,187
1880	3048	7235	0,069	0,121	0,190
1881	2973	7427	0,082	0,131	0,213
1882	3910	7294	0,026	0,077	0,103
1883	4334	7566	0,019	0,065	0,084
1884	4644	7430	0,011	0,051	0,063
1885	5415	7440	0,003	0,029	0,032
1886	5058	7413	0,006	0,038	0,044
1887	5281	7738	0,006	0,038	0,044
1888	6088	7678	0,001	0,017	0,018
1889	6881	8041	0,000	0,006	0,007
1890	6052	7825	0,002	0,020	0,022
1891	5098	7995	0,010	0,048	0,058
1892	6157	7646	0,001	0,014	0,015
1893	6369	7262	0,000	0,003	0,003
1894	7237	7325	0,001	0,000	0,001
1895	7293	7423	0,000	0,000	0,000
1896	7423	7541	0,000	0,000	0,000
1897	6521	7557	0,000	0,005	0,005
1898	6803	7980	0,000	0,007	0,007
1899	8553	8221	0,001	0,000	0,001
1900	7572	8316	0,000	0,000	0,000
1901	8491	8429	0,001	0,000	0,001
1902	8084	8436	0,000	0,000	0,000
1903	9401	8640	0,002	0,000	0,002
1904	10284	8681	0,004	0,000	0,004
1905	10836	10971	0,001	0,000	0,001
1906	10508	11670	0,000	0,000	0,000
1907	9800	11771	0,000	0,010	0,010
1908	10672	11161	0,000	0,000	0,000

1909	10606	11855	0,000	0,001	0,001
1910	10459	12168	0,000	0,006	0,006
1911	9763	12315	0,001	0,017	0,018
1912	11230	12537	0,000	0,001	0,001
1913	10531	12800	0,001	0,012	0,012
1914	8895	11881	0,002	0,025	0,027
1915	9349	12095	0,002	0,020	0,022
1916	8672	13018	0,007	0,042	0,049
1917	7356	13034	0,020	0,068	0,088
1918	9152	13106	0,005	0,035	0,040
1919	9116	12392	0,003	0,027	0,030
1920	9124	12166	0,002	0,024	0,027
1921	9203	11746	0,001	0,018	0,020
1922	9897	12239	0,001	0,014	0,015
1923	10511	12856	0,001	0,012	0,013
1924	11046	13166	0,000	0,009	0,009
1925	10271	13583	0,002	0,023	0,025
1926	10633	13666	0,002	0,019	0,021
1927	11149	14013	0,001	0,016	0,017
1928	10897	14119	0,002	0,020	0,022
1929	10710	14290	0,002	0,024	0,027
1930	9588	13408	0,004	0,031	0,035
1931	9618	12187	0,001	0,017	0,018
1932	9103	11533	0,001	0,017	0,018
1933	9155	11479	0,001	0,016	0,017
1934	9755	12196	0,001	0,015	0,016
1935	10793	12825	0,000	0,009	0,009
1936	10192	13705	0,003	0,025	0,028
1937	10745	14371	0,003	0,025	0,027
1938	10594	14205	0,003	0,025	0,028
1939	10823	14609	0,003	0,026	0,029
1940	10827	15840	0,006	0,038	0,044
1941	11209	17791	0,011	0,050	0,061
1942	11150	19896	0,021	0,069	0,090
1943	10895	21301	0,032	0,085	0,117
1944	11920	21532	0,022	0,071	0,093
1945	11342	20629	0,023	0,072	0,095
1946	12147	18549	0,008	0,044	0,052
1947	13265	18303	0,004	0,029	0,033
1948	13704	18678	0,003	0,027	0,030
1949	13198	18861	0,005	0,034	0,039

1950	12884	19757	0,009	0,045	0,053
1951	13105	20643	0,010	0,049	0,059
1952	12195	20881	0,017	0,062	0,079
1953	12592	21375	0,016	0,061	0,077
1954	12865	21315	0,014	0,057	0,071
1955	13520	22178	0,013	0,055	0,068
1956	13648	22578	0,014	0,057	0,070
1957	14107	22595	0,011	0,052	0,063
1958	14717	22497	0,008	0,044	0,053
1959	13539	23245	0,017	0,063	0,080
1960	14368	23704	0,014	0,056	0,070
1961	15142	23980	0,011	0,050	0,060
1962	14669	24663	0,015	0,059	0,074
1963	14101	25511	0,022	0,071	0,094
1964	15317	26703	0,019	0,065	0,084
1965	16470	27651	0,015	0,059	0,074
1966	16335	28523	0,019	0,065	0,084
1967	16533	29018	0,019	0,066	0,086
1968	17000	30081	0,020	0,068	0,088
1969	18186	30981	0,016	0,061	0,078
1970	18874	31327	0,014	0,057	0,071
1971	19271	32018	0,014	0,057	0,072
1972	19345	33202	0,017	0,063	0,080
1973	19730	34821	0,020	0,067	0,087
1974	20446	34877	0,016	0,062	0,078
1975	19988	34780	0,018	0,065	0,083
1976	19663	35943	0,024	0,073	0,097
1977	20583	36776	0,021	0,069	0,090
1978	19603	38005	0,031	0,083	0,114
1979	20629	38841	0,027	0,078	0,105
1980	20626	38523	0,026	0,077	0,103
1981	19199	38885	0,037	0,091	0,129
1982	18295	38043	0,042	0,096	0,138
1983	18746	38935	0,042	0,096	0,137
1984	18824	40736	0,049	0,103	0,152
1985	17247	42122	0,076	0,127	0,203
1986	18201	43003	0,068	0,120	0,188
1987	18385	44330	0,073	0,124	0,197
1988	17764	45828	0,091	0,138	0,229
1989	16283	46794	0,128	0,161	0,289
1990	15831	46688	0,138	0,167	0,306

1991	17319	45112	0,094	0,140	0,234
1992	18915	45378	0,071	0,123	0,195
1993	19898	46150	0,063	0,117	0,180
1994	21281	47853	0,057	0,111	0,167
1995	20056	48805	0,075	0,126	0,201
1996	20652	49858	0,073	0,125	0,198
1997	22124	51102	0,062	0,116	0,178
1998	22715	52513	0,063	0,116	0,179
1999	21701	54046	0,081	0,131	0,212
2000	21300	55555	0,095	0,140	0,235
2001	20159	56313	0,117	0,155	0,273
2002	17767	57422	0,180	0,189	0,368
2003	19158	58242	0,151	0,174	0,325
2004	20692	59393	0,128	0,161	0,289
2005	22385	60298	0,105	0,147	0,252
2006	23831	61433	0,091	0,138	0,229

Notes: 1) Per capita capital stock of a country equals three times its per capita income. 2) Per capita capital stock for the Anglo-Saxon group is the simple average of the per capita capital stocks of the four involved countries. 3) Triangle and Rectangle welfare costs are calculated according to eq. 7. 4) To put the Argentine per capita income into 1985 US dollars, we generated time series for the four comparison years suggested by Cortés Conde (1997) and averaged them.

Sources: 1) GDP times series for Argentina were taken from Cortés Conde (1997), period 1875-1935; IEERAL (1986), period 1936-1961; BCRA, period 1962-1997. Population time series for Argentina were taken from Cortés Conde (1997), period 1875-1912; IEERAL (1986), period 1913-1990. Remaining GDP and population data was taken from national accounts. 2) GDP and population series for the Anglo-Saxon group were taken from Maddison (1991) and updated until 2006 on data taken from various issues of the IMF International Financial Satistics Yearbook.