

Does the Fisher effect apply in high inflations?

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Abstract

This brief study examines the behavior of nominal interest rates in high-inflation years in a large number of countries between 1980 and 2000. Although interest rates are typically high, they substantially fall short of inflation rates in most cases. As expected, there exists a significantly positive association between nominal interest rates and inflation rates.

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An important problem in macroeconomics is the association of inflation and nominal interest rates. The Fisher equation states an approximate relationship between nominal interest rates, i , and inflation, π :

$$i = \pi + r, \quad (1)$$

where r denotes real interest rates. Real interest rates are typically small and relatively stable. According to the Fisher effect, nominal interest rates move together with inflation.

The present study examines the Fisher effect in high-inflation cases. The focus is narrowed to observations in which annual inflation exceeded 50%. The analysis contains all countries for which at least some data in the 1980-2000 period are available in the International Financial Statistics. The main questions are whether nominal interest rates tend to be high if inflation is high, whether nominal interest rates are higher or lower than inflation, and whether there exists a statistically significant association between interest rates and inflation.

Table 1 presents inflation and nominal interest rates for 205 observations. Inflation was derived from consumer prices, while interest rates were mostly based on discount rates. Nominal interest rates are typically high in these high-inflation situations. If we exclude the

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outlying observations for Argentina in 1989 and 1990 with extremely high interest rates, the average interest rate makes 262.4% (standard deviation 1264.2%). In this sense the Fisher effect applies. However, on average there exists a large gap between inflation rates and interest rates. Inflation is higher than interest rates in 159 observations and lower than interest rates in just 46 observations. Interest rates are notably higher than inflation in Argentina, Brazil, Israel, Mongolia, Mozambique, Uruguay, and Zimbabwe. If we exclude the two outlying observations for Argentina, the regression of interest rates on inflation yields:

$$i = 0.168 \pi, \quad (2)$$

(3.21)

where $R^2 = 0.03$ (the t-statistic is in parentheses). Interest rates are on average much lower than inflation. If a constant is included in the regression, we obtain:

$$i = 190.1\% + 0.131 \pi, \quad (3)$$

(2.05) (2.38)

where R^2 is again 0.03. Nominal interest rates change much less than one to one with inflation. Real interest rates are substantially negative in high inflations. This result is puzzling since real returns on capital should not be much affected by inflation. A theoretical explanation of this result is left for future research.

REFERENCES

International Monetary Fund, International Financial Statistics Yearbook 2002, Washington, DC.

Table 1: Inflation rates and interest rates.

Country	Year	π (%)	i (%)
Albania	1992	227.2	40.0
	1993	85.1	34.0
Angola	1996	4145.0	2.0
	1997	219.2	48.0
	1998	86.9	58.0
	1999	286.2	120.0
	2000	325.0	150.0
Argentina	1988	341.1	524.0
	1989	3082.9	1387179.0
	1990	2370.0	9695422.0
	1991	172.1	71.0
Armenia	1994	5071.4	210.0
	1995	176.2	77.8
Azerbaijan	1992	912.3	12.0
	1993	1129.0	100.0
	1994	1664.5	200.0
	1995	411.7	80.0
Belarus	1992	966.5	30.0
	1993	1190.2	210.0
	1994	2221.0	480.0
	1995	709.3	66.0
	1996	52.7	8.3
	1997	63.9	8.9
	1998	72.9	9.6
	1999	293.7	23.4
Bolivia	1985	8300.0	172.2
	1986	278.6	65.8
Brazil	1981	100.0	89.7
	1982	100.0	120.7

	1983	125.0	203.2
	1984	200.0	257.3
	1985	225.9	281.7
	1986	147.7	105.2
	1987	228.4	424.4
	1988	629.3	1192.9
	1989	1430.9	6405.0
	1990	2947.7	15778.6
	1991	402.2	847.5
	1992	988.3	1574.3
	1993	2500.0	3284.4
	1994	2342.3	4820.6
	1995	57.5	53.4
Bulgaria	1991	331.8	54.0
	1992	91.6	41.0
	1993	73.1	52.0
	1994	95.9	72.0
	1995	62.1	34.0
	1996	121.6	180.0
	1997	1058.4	6.7
Congo, Dem. Rep. of	1994	15500.0	145.0
	1995	541.0	125.0
	1996	658.8	238.0
	1997	175.5	13.0
Costa Rica	1982	91.4	30.0
Croatia	1992	775.0	1889.4
	1993	1497.1	34.5
	1994	77.6	8.5
Ecuador	1988	60.9	23.0
	1989	74.3	32.0
	1992	54.4	49.0
	1999	52.3	64.4
	2000	96.1	13.2

Gambia	1986	56.3	20.0
Ghana	1980	50.0	13.5
	1981	111.1	19.5
	1983	121.7	14.5
Guinea-Bissau	1991	57.6	42.0
	1992	69.3	45.5
	1996	50.7	54.0
Iceland	1980	62.1	28.0
	1982	51.4	28.0
	1983	84.9	22.0
Indonesia	1998	57.7	38.4
Israel	1982	100.0	108.2
	1983	150.0	311.0
	1984	370.0	690.3
	1985	300.0	79.6
Jamaica	1991	50.8	26.3
	1992	77.5	30.5
Kazakhstan	1994	1911.1	230.0
	1995	176.2	52.5
Kyrgyz Republic	1994	215.8	94.1
Lao People's Dem. Rep.	1989	61.5	30.0
	1998	91.0	17.8
	1999	128.5	13.4
Latvia	1993	108.9	27.0
Lithuania	1993	407.3	91.8
	1994	72.1	62.3
Macedonia, FYR	1994	126.6	33.0
Malawi	1995	83.5	50.0
Mexico	1980	50.0	22.5
	1982	50.0	45.8
	1983	100.0	59.1
	1984	66.7	49.3

	1985	60.0	63.2
	1986	84.4	88.0
	1987	132.2	95.6
	1988	113.9	69.0
Mongolia	1993	269.6	628.8
	1994	87.6	180.0
	1995	56.7	150.0
Mozambique	1994	63.2	69.7
	1995	54.3	57.8
Myanmar	1998	51.5	15.0
Nicaragua	1989	4773.0	311.0
	1990	7485.5	10.0
	1991	2884.2	15.0
Nigeria	1988	56.1	12.8
	1989	50.6	18.5
	1993	57.7	26.0
	1994	56.9	13.5
	1995	72.7	13.5
Peru	1980	60.0	29.5
	1981	79.2	44.5
	1982	62.8	44.5
	1983	112.9	60.0
	1984	109.4	60.0
	1985	163.8	42.6
	1986	77.9	36.1
	1987	85.9	29.8
	1988	667.0	748.0
	1989	3376.2	865.6
	1990	7483.2	289.6
	1991	412.7	67.7
	1992	73.4	13.2
Poland	1984	50.0	4.0
	1989	257.1	104.0

	1990	568.0	48.0
	1991	76.6	36.0
Romania	1994	137.0	66.9
	1997	154.8	45.0
	1998	59.1	37.9
Russia	1995	197.5	160.0
	1999	85.7	55.0
Sierra Leone	1983	100.0	11.0
	1984	100.0	12.0
	1985	75.0	12.0
	1986	71.4	14.5
	1987	183.3	16.5
	1989	60.9	22.0
	1990	110.8	47.5
	1991	102.6	50.7
	1992	65.5	78.6
Sudan	1982	100.0	10.5
	1984	50.0	13.5
Suriname	1993	146.2	9.4
	1994	365.6	15.4
	1995	235.6	40.2
	1999	98.9	27.3
Syria	1987	59.5	5.0
Turkey	1981	100.0	31.5
	1983	50.0	48.5
	1985	50.0	52.0
	1986	50.0	48.0
	1988	75.0	54.0
	1989	61.9	54.0
	1990	61.8	45.0
	1991	65.5	48.0
	1992	70.3	48.0
	1993	66.5	48.0

	1994	106.2	55.0
	1995	88.0	50.0
	1996	80.3	50.0
	1997	85.8	67.0
	1998	84.6	67.0
	1999	64.9	60.0
	2000	54.9	60.0
Uganda	1982	100.0	11.0
	1984	50.0	24.0
	1985	166.7	24.0
	1986	162.5	36.0
	1987	204.8	31.0
	1988	195.3	45.0
	1989	60.8	55.0
	1992	52.4	41.0
Ukraine	1993	4734.9	240.0
	1994	891.2	252.0
	1995	376.7	110.0
	1996	80.3	40.0
Uruguay	1983	100.0	112.7
	1984	50.0	133.2
	1985	66.7	145.1
	1986	80.0	138.4
	1987	66.7	143.4
	1988	60.0	154.5
	1989	83.3	219.6
	1990	111.4	251.6
	1991	101.1	219.0
	1992	68.4	162.4
	1993	54.3	164.3
Venezuela	1989	82.3	45.0
	1994	60.7	48.0
	1995	60.0	49.0

	1996	99.9	45.0
	1997	50.0	45.0
Zambia	1986	50.0	30.0
	1987	66.7	15.0
	1989	128.6	18.4
	1990	100.0	35.1
	1992	166.7	47.0
	1993	188.7	72.5
	1994	53.6	20.5
Zimbabwe	1999	58.5	74.4
	2000	55.9	57.8

Notes: Inflation was measured from the consumer price index (period averages). For Brazil in 1991 and 1992, inflation was derived from wholesale prices. For the Kyrgyz Republic it was derived from producer prices. Some inflation estimates (in particular for early years in high-inflation countries) are only rough approximations since the underlying data is rounded. Whenever available, the interest rate was measured by the discount rate, bank rate, or refinancing rate (code 60 in the International Financial Statistics). These rates typically apply for ends of periods. For Argentina and Brazil, the money market rate (code 60b) was used. The lending rate (code 60p) was used for Bolivia, Lithuania, Suriname, and Zambia in 1989 and 1990. The government bond yield (code 61) was used for Jamaica. The deposit rate (code 60l) was used for Lao in 1989 and Sudan. The T-bill rate (code 60c) was used for Mexico in 1980-1985 and for Sierra Leone. These rates are typically year averages.