

Calculation of Real Exchange Rate between Philippine Peso and US Dollar

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We calculated a real exchange rate using the following expressions.

$$\begin{aligned} \text{Real exchange rate [Pesos/US\$]} \\ = \text{Nominal exchange rate [Pesos/US\$]} \times \frac{\text{Price level of the US}}{\text{Price level of the Philippine}} \end{aligned}$$

↑

(1) CPI (Consumer Price Index)
(2) WPI (Wholesale Price Index)
(3) GDP deflator

Periods: 1) 1898-1941 (base year 1939=100)
2) 1943-1945 (base year 1941=100)
3) 1946-2020 (base year 1985=100)

The nominal exchange rate and prices information that we used for a calculation are as follows.
(references)

Philippine:

Yoshiko Nagano (2023), "A Brief Overview of the Monetary and Foreign Exchange Control Policy in the Philippines: 1898 – 2010"

Konosuke Odaka (2023), "Estimating Provisional Consumer Price Index (CPI) of The Philippines, 1902~1940"

Philippine Statistics Authority (<https://psa.gov.ph/statistics/national-accounts/data-series>)

Central Bank of the Philippines, *Statistical Bulletin Vol.xxvi December, 1974.*

Central Bank of the Philippines, *Thirty-Second Annual Report 1980.*

Central Bank of the Philippines, *1990 Anunual Report Statistical Bulletin.*

'Price information for Mr. Hara 20ix2023'file compiled by Odaka.

US :

【WPI】

US Department of Commerce, 1975, *Historical statistics of the United States, colonial times to 1970*, Bureau of the Census.

US. Bureau of Labor Statistics, Website <http://www.bls.gov/ppi/> Producer Price Index for All Commodities (Index 1982=100)。

International Monetary Fund, World Economic Outlook Database, April 2023.

United States Department of Commerce, *Survey of Current Business*, Bureau of Foreign and Domestic Commerce.

【CPI, GDP deflator】

Hills, S, Thomas, R and Dimsdale, N (2016) "Three Centuries of Data - Version 2.3", Bank of England.

International Monetary Fund, World Economic Outlook Database, April 2023.

The calculation results are shown in the tables below.

Peso to US dollar exchange rate (1), 1902-1941

Year	Nominal exchange rate (pesos/US\$)	Real exchange rate (pesos/US\$) CPI	Real exchange rate (pesos/US\$) WPI	Real exchange rate (pesos/US\$) GDP deflator
1899				
1900				
1901				
1902	2.41	1.95	2.16	1.42
1903	2.01	1.57	1.61	1.20
1904	2.01	1.60	1.54	1.14
1905	2.01	1.55	1.41	1.08
1906	2.01	1.56	1.50	1.10
1907	2.01	1.61	1.56	1.17
1908	2.01	1.55	1.50	1.21
1909	2.01	1.44	1.72	1.17
1910	2.01	1.54	1.41	1.18
1911	2.01	1.49	1.31	1.17
1912	2.01	1.38	1.36	1.18
1913	2.01	1.49	1.43	1.18
1914	2.01	1.56	1.47	1.18
1915	2.01	1.39	1.40	1.19
1916	2.02	1.57	1.67	1.32
1917	2.01	1.57	2.08	1.43
1918	2.01	1.43	1.95	1.43
1919	2.05	1.32	1.60	1.23
1920	2.11	1.27	1.29	1.42
1921	2.19	1.58	1.66	1.64
1922	2.05	1.92	1.72	1.69
1923	2.01	1.78	1.36	1.53
1924	2.01	1.75	1.25	1.49
1925	2.01	1.73	1.46	1.52
1926	2.01	1.92	1.45	1.55
1927	2.01	1.92	1.30	1.52
1928	2.02	1.92	1.47	1.63
1929	2.00	1.91	1.41	1.62
1930	2.00	2.04	1.37	1.73
1931	2.00	2.23	1.53	1.92
1932	2.00	2.39	1.68	1.97
1933	2.00	2.19	1.73	1.94
1934	2.00	2.14	1.89	2.00
1935	2.00	2.19	1.87	1.86
1936	2.00	2.18	1.78	1.84
1937	2.00	2.18	1.94	1.89
1938	2.00	2.06	1.81	1.90
Base year 1939	2.00	2.00	2.00	2.00
1940	2.01	1.95	2.19	2.00
1941	2.01	2.00		

Source) Nominal exchange rate: Nagano(2023) Table1

Peso to US dollar exchange rate (2), 1943-1945

		Nominal exchange rate peso/US \$	Real exchange rate peso/US \$
Base year	1941	2.01	2.01
	1942 January		
	February		
	March		
	April		
	May		
	June		
	July		
	August		
	September		0
	October		
	November		
	December		0
	1943 January		
	February		
	March		0
	April		
	May		
	June		0
	July		
	August		
	September	3.35	0.84
	October	11.44	2.50
	November	33.11	5.03
	December	30.67	2.83
	1944 January	33.90	2.33
	February	39.37	2.30
	March	40.32	2.26
	April	41.15	1.78
	May	84.75	2.80
	June	136.99	2.96
	July	166.67	2.57
	August	232.56	2.56
	September	588.24	4.64
	October	833.33	6.55
	November	1,250.00	9.81
	December	1,250.00	9.79
	1945 January	1,428.57	11.21

(Sources)

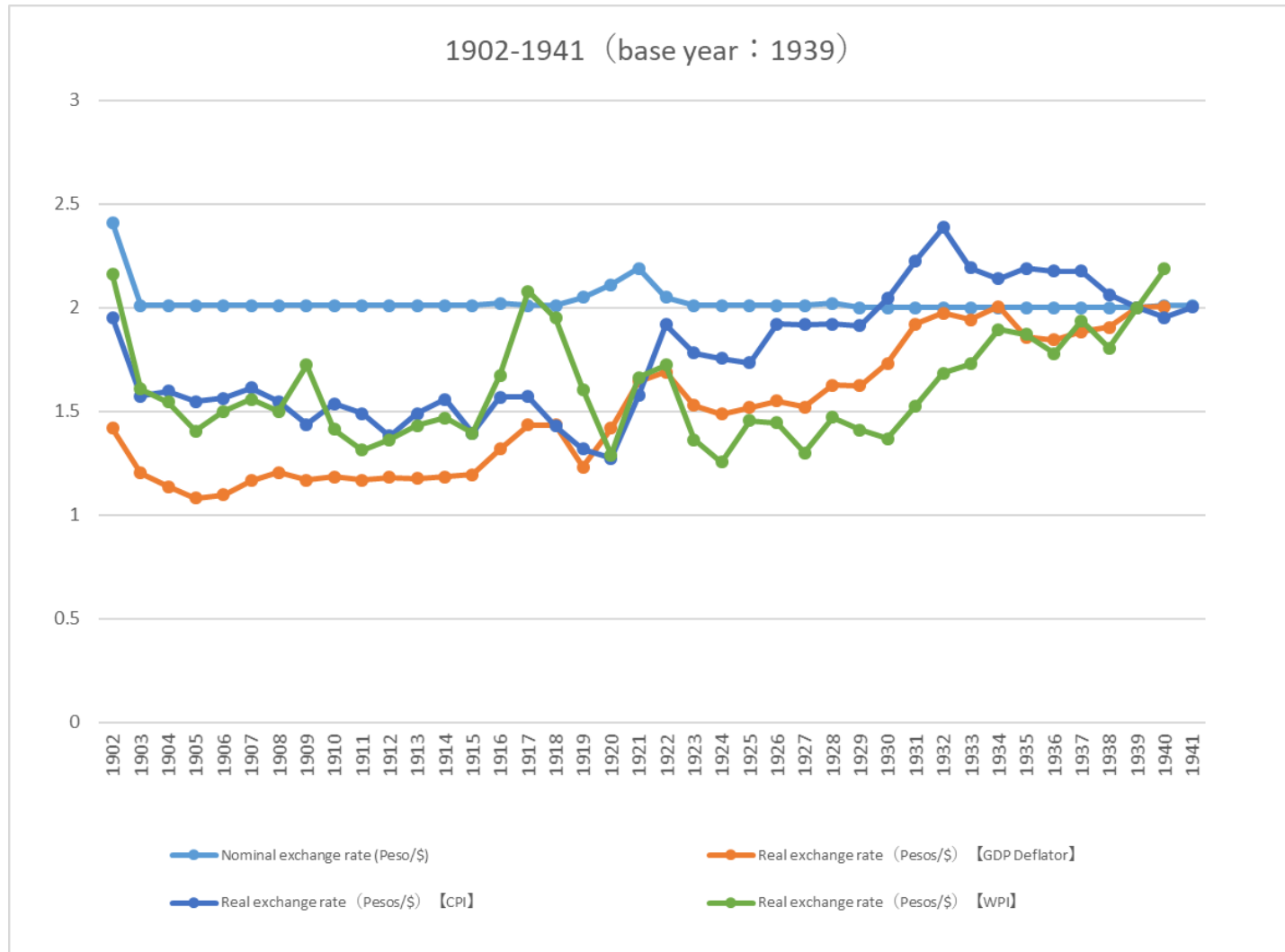
Philippine : Nagano (2023): Table 3

Peso to US dollar exchange rate (3), 1946-2020

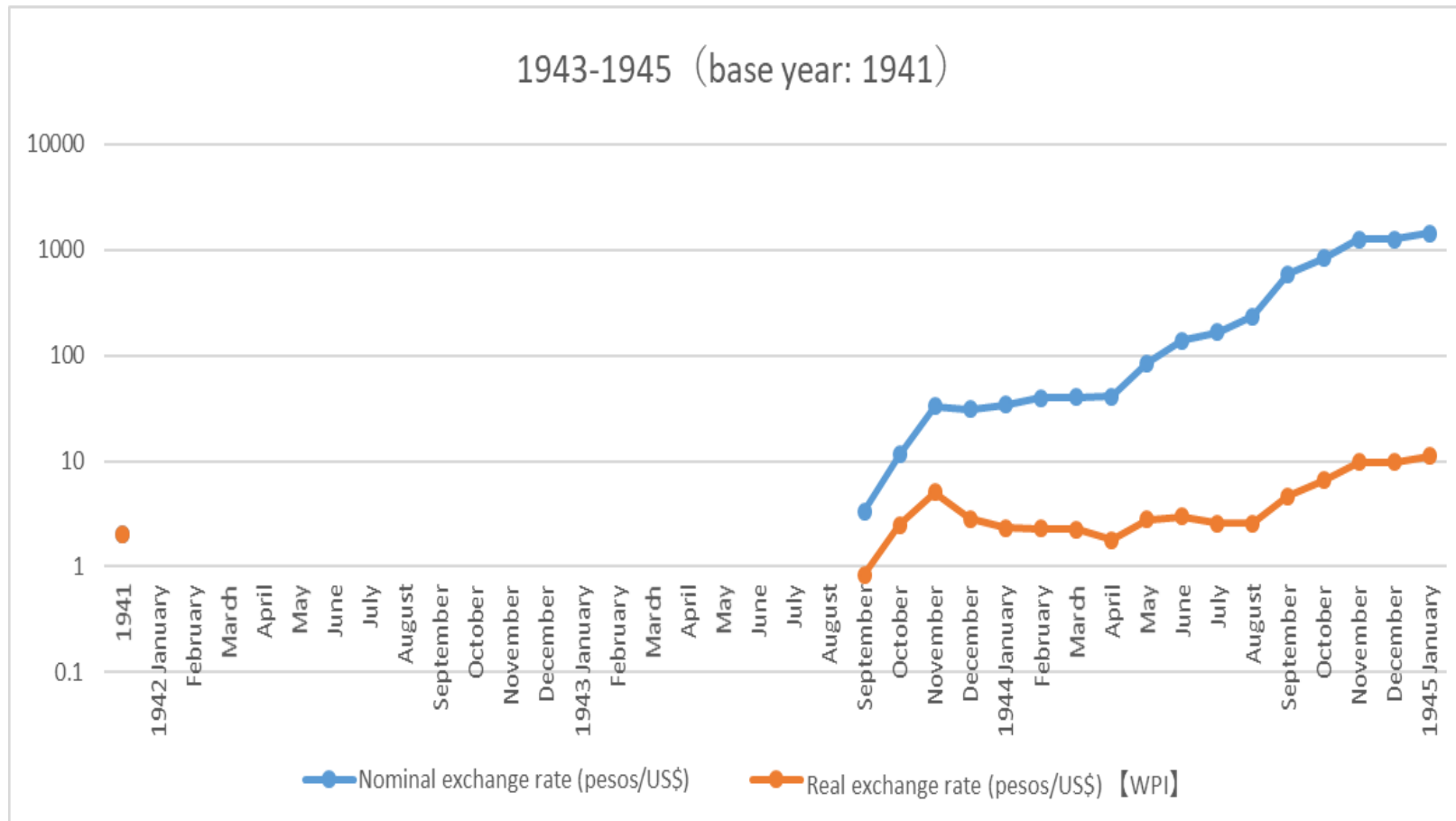
Year	Nominal exchange rate (pesos/US\$)	exchange rate (pesos/US\$) CPI	exchange rate (pesos/US\$) WPI	exchange rate (pesos/US\$) GDP deflator
1946	2.00	4.07		5.67
1947	2.00	6.28		7.00
1948	2.00	7.16		7.85
1949	2.00	7.31	13.07	7.98
1950	2.00	7.16	14.01	8.22
1951	2.00	7.13	13.90	8.74
1952	2.00	7.79	14.79	9.04
1953	2.00	8.13	14.73	9.40
1954	2.00	8.29	15.59	9.88
1955	2.00	8.34	16.02	10.07
1956	2.00	8.24	16.05	10.16
1957	2.00	8.39	15.85	10.14
1958	2.00	8.34	15.53	10.15
1959	2.00	8.49	15.37	10.08
1960	2.02	8.33	14.86	9.76
1961	2.02	8.31	14.16	9.59
1962	3.73	14.66	24.95	16.79
1963	3.91	14.74	23.77	16.35
1964	3.91	13.80	22.72	15.88
1965	3.91	13.68	22.71	15.55
1966	3.90	13.32	22.40	15.14
1967	3.90	12.90	21.90	15.26
1968	3.90	13.13	21.83	14.95
1969	3.90	13.57	22.42	14.81
1970	5.90	19.02	28.46	20.48
1971	6.43	18.86	27.67	20.46
1972	6.67	18.34	27.24	20.79
1973	6.76	17.30	25.04	18.95
1974	6.79	14.45	19.35	15.61
1975	7.25	15.57	21.40	16.63
1976	7.44	15.91	21.05	16.62
1977	7.40	15.62	20.23	16.21
1978	7.37	15.55	20.30	15.78
1979	7.38	14.58	19.35	14.89
1980	7.51	14.30	19.00	14.47
1981	7.90	14.80	19.06	14.88
1982	8.54	15.30	18.93	15.73
1983	11.11	18.53	21.47	18.62
1984	16.70	19.47	19.83	18.94
Base year 1985	18.61	18.61	18.61	18.61
1986	20.39	19.72	20.11	20.21
1987	20.57	19.32	19.08	19.46
1988	21.09	18.75	17.95	18.81
1989	21.74	18.48	17.54	18.46
1990	24.31	18.75	18.46	18.96
1991	27.48	18.31	17.84	19.02
1992	25.51	15.60	16.08	16.74
1993	27.12	15.47	17.36	17.06
1994	26.42	14.02	15.76	15.42
1995	25.71	12.97	15.06	14.23
1996	26.22	12.56	14.44	13.72
1997	29.47	13.55	16.13	14.77
1998	40.89	17.36	19.55	18.76
1999	39.09	16.08	17.88	17.12
2000	44.19	17.96	20.21	18.71
2001	50.99	19.91	21.88	20.90
2002	51.60	19.83	20.60	20.61
2003	54.20	20.56	21.72	21.40
2004	56.04	20.58	22.00	21.46
2005	55.09	19.31	20.85	20.56
2006	51.31	18.05	18.75	18.78
2007	46.15	15.42	17.12	16.81
2008	44.32	14.76	16.15	15.36
2009	47.68	15.24	16.53	16.20
2010	45.11	14.00	15.78	14.87
2011	43.31	13.44	15.17	14.02
2012	42.23	12.99	14.71	13.65
2013	42.45	12.72	14.63	13.66
2014	44.40	13.33	14.91	14.09
2015	45.50	13.45	13.95	14.70
2016	47.49	13.77	14.05	15.30
2017	50.40	14.49	15.26	16.17
2018	52.66	14.51	16.34	16.67
2019	51.80	14.24	15.64	16.58
2020	49.62	13.45	14.23	15.83

Source) Nominal exchange rate: Nagano(2023) Table5

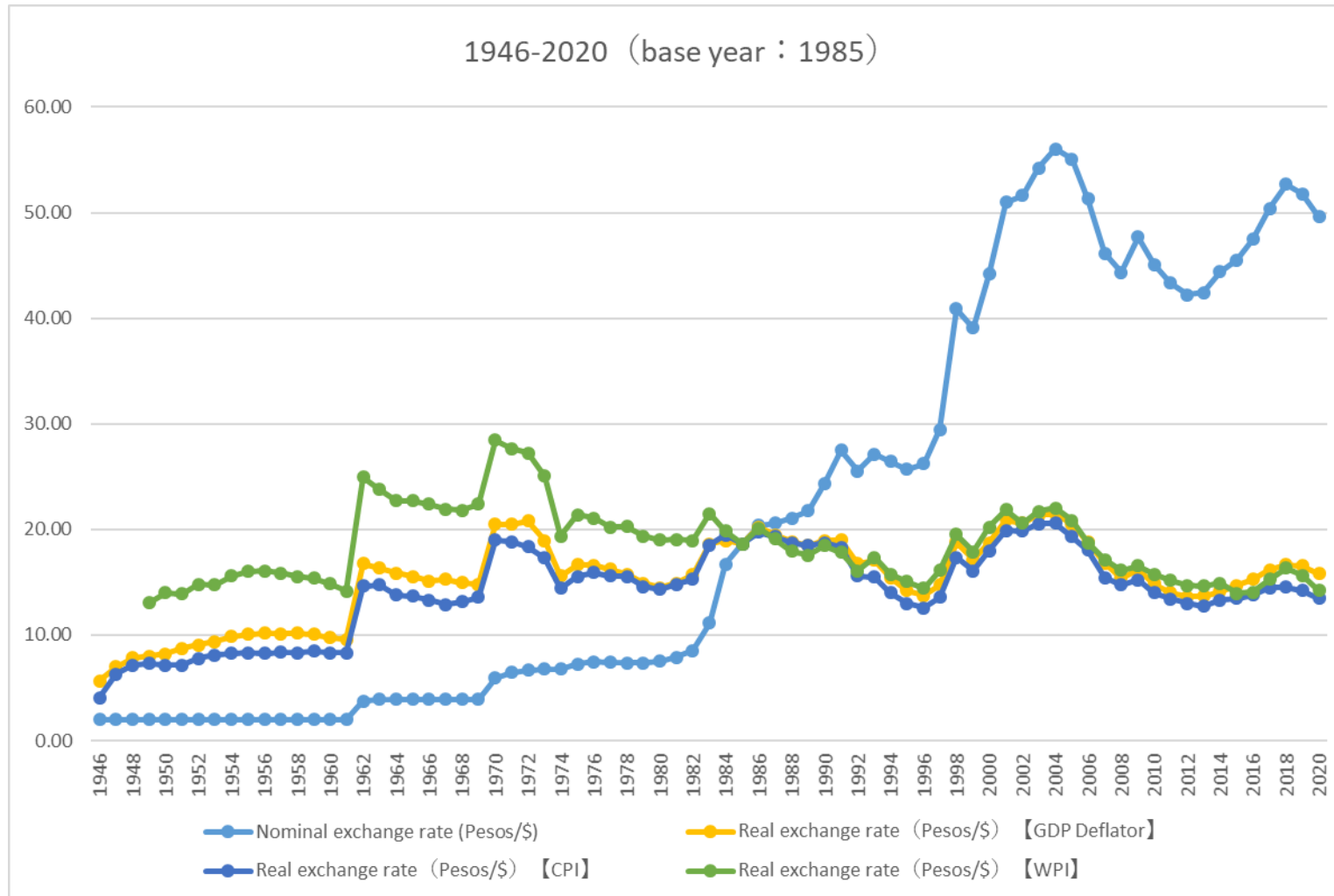
Peso to US dollar exchange rate (1), 1902-1941



Peso to US dollar exchange rate (2), 1943-1945



Peso to US dollar exchange rate (3), 1946-2020



Price information(1):1902-1941

CPI[1939=100]

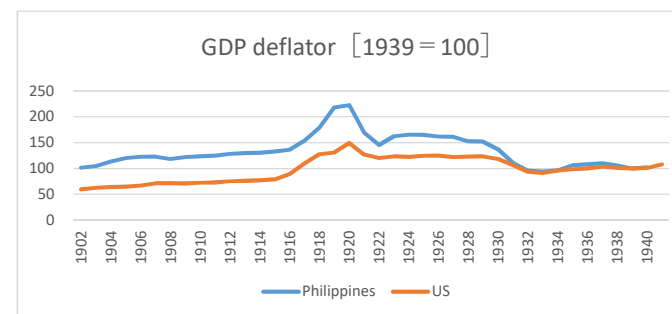
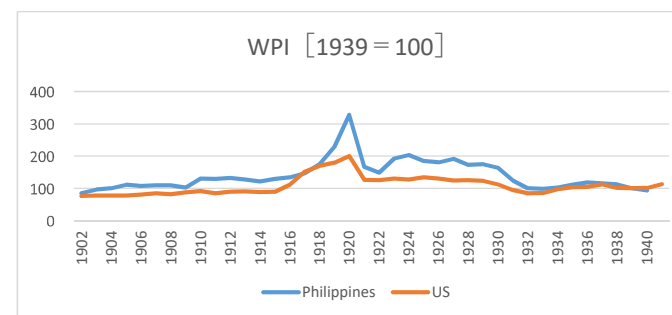
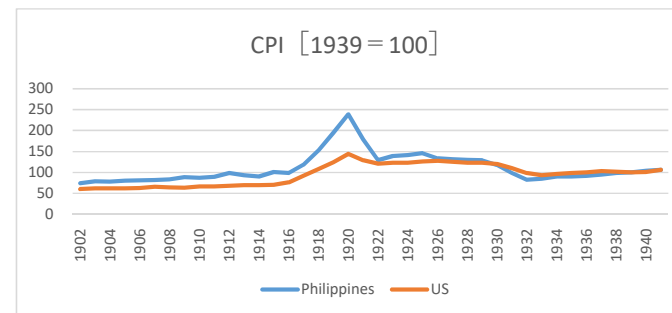
	Philippines	US
1902	74.11	60.04
1903	78.51	61.41
1904	78.24	62.13
1905	79.84	61.41
1906	80.70	62.78
1907	81.78	65.59
1908	83.39	64.22
1909	88.80	63.50
1910	86.70	66.31
1911	89.54	66.31
1912	98.47	67.67
1913	93.28	69.11
1914	90.00	69.76
1915	101.11	70.12
1916	98.73	76.60
1917	118.15	92.30
1918	152.60	108.42
1919	193.91	124.55
1920	238.90	144.28
1921	179.03	128.87
1922	129.10	120.73
1923	138.77	122.89
1924	141.06	123.11
1925	146.22	126.21
1926	133.40	127.43
1927	131.12	125.05
1928	129.69	123.33
1929	128.95	123.33
1930	117.69	120.23
1931	98.52	109.65
1932	82.38	98.34
1933	85.11	93.30
1934	90.11	96.40
1935	90.33	98.85
1936	91.71	99.78
1937	94.97	103.38
1938	98.39	101.44
1939	100.00	100.00
1940	103.99	101.01
1941	106.46	106.05

WPI[1939=100]

	Philippines	US
1902	85.20	76.38
1903	96.40	77.14
1904	100.80	77.39
1905	111.40	77.89
1906	107.70	80.40
1907	108.90	84.42
1908	109.20	81.41
1909	102.20	87.69
1910	130.10	91.46
1911	129.00	84.17
1912	131.90	89.45
1913	127.00	90.45
1914	121.00	88.44
1915	129.60	89.95
1916	133.70	110.80
1917	147.20	152.26
1918	175.10	169.85
1919	229.20	179.40
1920	327.50	200.00
1921	166.40	126.38
1922	149.10	125.38
1923	192.40	130.40
1924	203.30	126.88
1925	185.00	133.92
1926	180.30	129.65
1927	191.50	123.87
1928	172.70	125.63
1929	174.90	123.37
1930	163.80	112.06
1931	123.80	94.47
1932	100.30	84.42
1933	98.80	85.43
1934	102.40	96.98
1935	110.90	103.77
1936	117.80	104.77
1937	115.50	111.81
1938	112.70	101.76
1939	100.00	100.00
1940	93.50	101.76
1941	113.32	113.32

GDP deflator [1939=100]

	Philippines	US
1902	101.49	59.70
1903	104.51	62.56
1904	113.55	64.18
1905	120.14	64.68
1906	122.72	67.04
1907	122.81	71.27
1908	118.63	71.14
1909	121.92	70.90
1910	123.42	72.76
1911	124.52	72.39
1912	128.22	75.37
1913	129.58	75.87
1914	130.22	76.62
1915	132.94	78.98
1916	136.45	89.05
1917	153.85	109.83
1918	179.29	127.99
1919	218.15	131.09
1920	222.48	149.38
1921	169.62	127.36
1922	145.95	120.27
1923	162.50	123.63
1924	165.22	122.14
1925	164.76	124.38
1926	161.87	124.88
1927	161.18	121.89
1928	152.61	122.89
1929	151.79	123.13
1930	137.08	118.66
1931	110.74	106.34
1932	95.18	93.91
1933	94.13	91.42
1934	96.16	96.39
1935	105.96	98.38
1936	108.11	99.63
1937	110.05	103.73
1938	105.92	100.87
1939	100.00	100.00
1940	101.38	101.12
1941	107.96	107.96

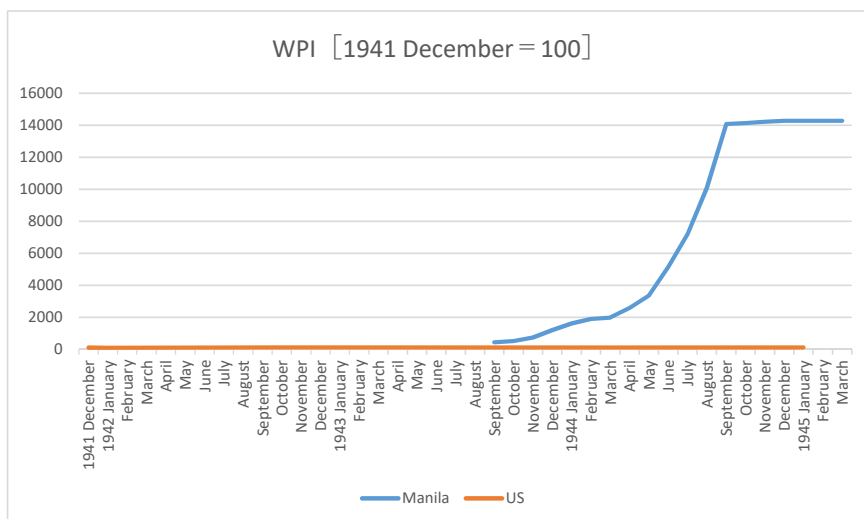


Price information (2): 1941-1945

WPI

Dec-1941=100

	Manila	US
1941 December	100	100.0
1942 January		102.6
February		103.3
March		104.3
April		100.1
May		105.6
June		105.3
July		105.4
August		106.0
September	186	106.4
October		106.8
November		107.2
December	200	107.9
1943 January		108.9
February		109.5
March	245	110.5
April		110.8
May		111.2
June	247	110.9
July		110.3
August		110.1
September	437	110.1
October	504	110.0
November	724	109.9
December	1,196	110.3
1944 January	1,609	110.4
February	1,891	110.7
March	1,976	110.9
April	2,567	111.0
May	3,363	111.1
June	5,154	111.4
July	7,206	111.2
August	10,074	111.0
September	14,084	111.1
October	14,151	111.2
November	14,218	111.5
December	14,285	111.9
1945 January	14,285	112.1
February	14,285	
March	14,285	



Price information(3):1946-2020

CPI[1985=100]

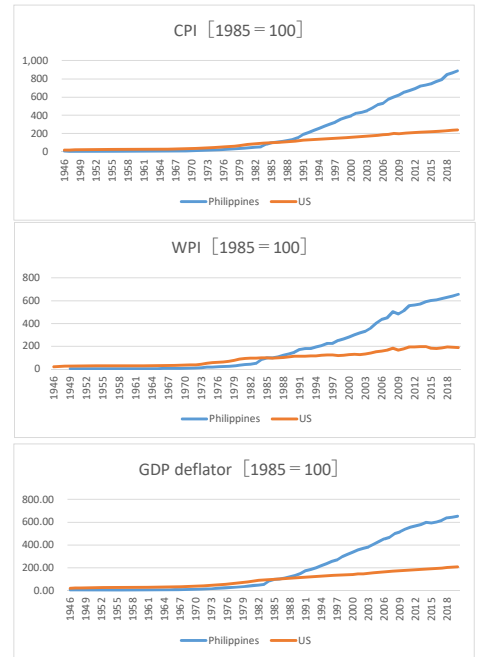
	Philippines	US
1946	8.92	18.16
1947	6.62	20.76
1948	6.25	22.38
1949	6.06	22.17
1950	6.25	22.38
1951	6.77	24.14
1952	6.33	24.67
1953	6.12	24.86
1954	6.03	24.98
1955	5.97	24.89
1956	6.13	25.26
1957	6.24	26.16
1958	6.45	26.88
1959	6.39	27.10
1960	6.65	27.53
1961	6.76	27.81
1962	7.15	28.12
1963	7.55	28.46
1964	8.17	28.84
1965	8.38	29.33
1966	8.83	30.17
1967	9.39	31.04
1968	9.60	32.34
1969	9.80	34.08
1970	11.20	36.10
1971	12.84	37.65
1972	14.15	38.89
1973	16.14	41.31
1974	21.54	45.85
1975	23.30	50.04
1976	24.74	52.92
1977	26.69	56.33
1978	28.72	60.61
1979	34.12	67.44
1980	40.21	76.56
1981	45.10	84.51
1982	50.07	89.68
1983	55.50	92.57
1984	82.84	96.56
1985	100.00	100.00
1986	105.29	101.86
1987	112.39	105.58
1988	123.70	109.94
1989	135.58	115.24
1990	157.47	121.47
1991	190.00	126.58
1992	213.26	130.39
1993	235.40	134.29
1994	259.52	137.73
1995	280.80	141.64
1996	304.42	145.82
1997	324.40	149.16
1998	356.84	151.49
1999	376.31	154.83
2000	393.70	160.04
2001	421.65	164.59
2002	435.03	167.19
2003	450.78	171.00
2004	477.95	175.56
2005	517.71	181.51
2006	532.72	187.36
2007	576.73	192.70
2008	601.06	200.09
2009	623.84	199.39
2010	652.83	202.66
2011	673.54	209.05
2012	693.73	213.37
2013	722.20	216.51
2014	732.56	220.02
2015	745.50	220.28
2016	769.32	223.07
2017	792.61	227.82
2018	846.73	233.38
2019	864.54	237.61
2020	887.83	240.59

WPI[1985=100]

	Philippines	US
1946		20.14
1947		24.74
1948		26.77
1949	3.89	25.45
1950	3.78	26.45
1951	4.24	29.46
1952	3.88	28.68
1953	3.84	28.29
1954	3.64	28.39
1955	3.54	28.39
1956	3.66	29.36
1957	3.81	30.23
1958	3.94	30.62
1959	4.00	30.72
1960	4.16	30.72
1961	4.37	30.62
1962	4.59	30.72
1963	5.04	30.62
1964	5.27	30.62
1965	5.39	31.30
1966	5.62	32.27
1967	5.76	32.36
1968	5.92	33.14
1969	6.00	34.50
1970	7.42	35.76
1971	8.58	36.92
1972	9.45	38.57
1973	11.77	43.60
1974	18.18	51.84
1975	19.17	56.59
1976	20.93	59.21
1977	23.01	62.89
1978	24.58	67.73
1979	29.08	76.26
1980	34.39	87.02
1981	39.35	94.96
1982	43.72	96.90
1983	50.81	98.16
1984	84.64	100.48
1985	100.00	100.00
1986	98.41	97.09
1987	107.35	99.61
1988	121.76	103.59
1989	134.71	108.72
1990	148.41	112.69
1991	173.85	112.89
1992	180.23	113.57
1993	180.02	115.21
1994	195.62	116.67
1995	206.29	120.83
1996	224.71	123.74
1997	225.86	123.64
1998	252.13	120.54
1999	265.81	121.61
2000	281.22	128.59
2001	303.07	130.04
2002	318.29	127.03
2003	334.01	133.82
2004	362.02	142.15
2005	402.98	152.52
2006	436.83	159.59
2007	450.74	167.25
2008	504.12	183.72
2009	483.25	167.54
2010	511.73	178.97
2011	556.00	194.77
2012	562.35	195.93
2013	571.91	197.09
2014	592.16	198.93
2015	601.72	184.50
2016	607.34	179.65
2017	619.15	187.50
2018	630.96	195.74
2019	641.08	193.60
2020	656.83	188.37

GDP deflator [1985=100]

	Philippines	US
1946	7.16	20.30
1947	6.44	22.52
1948	6.05	23.76
1949	5.95	23.72
1950	5.84	24.02
1951	5.88	25.72
1952	5.79	26.15
1953	5.64	26.48
1954	5.41	26.73
1955	5.40	27.18
1956	5.53	28.11
1957	5.73	29.05
1958	5.85	29.70
1959	5.98	30.12
1960	6.31	30.54
1961	6.50	30.87
1962	6.94	31.25
1963	7.56	31.60
1964	7.90	32.09
1965	8.21	32.67
1966	8.65	33.60
1967	8.84	34.57
1968	9.40	36.04
1969	9.96	37.81
1970	11.48	39.81
1971	13.15	41.82
1972	14.01	43.64
1973	16.41	46.02
1974	21.80	50.14
1975	23.87	54.79
1976	25.87	57.79
1977	28.04	61.39
1978	30.66	65.69
1979	35.24	71.12
1980	40.26	77.53
1981	44.99	84.77
1982	48.88	90.02
1983	55.85	93.57
1984	85.43	96.91
1985	100.00	100.00
1986	102.89	102.03
1987	110.61	104.63
1988	121.40	108.28
1989	132.45	112.49
1990	149.61	116.65
1991	174.14	120.55
1992	187.86	123.29
1993	200.66	126.22
1994	220.84	128.91
1995	237.72	131.59
1996	256.00	134.00
1997	272.02	136.29
1998	300.33	137.77
1999	319.35	139.88
2000	337.93	143.06
2001	356.92	146.31
2002	372.02	148.57
2003	383.90	151.54
2004	406.51	155.70
2005	430.54	160.71
2006	452.55	165.64
2007	466.87	170.06
2008	500.38	173.39
2009	514.08	174.70
2010	536.55	176.83
2011	557.58	180.49
2012	568.70	183.82
2013	580.42	186.81
2014	598.14	189.88
2015	593.84	191.79
2016	601.44	193.71
2017	615.40	197.39
2018	638.42	202.14
2019	642.87	205.76
2020	653.48	208.45



(Notes) 1902-1941

CPI :

Philippines:

Odaka (2023) 'Estimating Provisional Consumer Price Index (CPI) of The Philippines, 1902~1940' Appendix III: CPI Time-series Data Long-run Provisional CPI, 1902~2005 and Some Related Series Combined CPI [1980 = 100], the base year was changed to 1939 = 100.

US :

The base year of Hills, S, Thomas, R and Dimsdale, N (2016) index [1982-1984=100] was changed to [1939=100].

WPI:

Philippines:

Hooley's wholesale price index [1939= 1.0] found in (2) Long-run Provisional CPI, 1902-2005 and Some Related Series by Odaka (2023) was converted to [1939=100].

US:

Department of Commerce, 1975, *Historical statistics of the United States, colonial times to 1970* , Bureau of the Census.

GDP deflator:

Philippines:

I converted Hooley's GDP implicit deflators, adjusted by Odaka [1939 = 1.0] to [1939 = 100] in Odaka(2023)

US:

The base year of Hills, S, Thomas, R and Dimsdale, N (2016) index [2009=100] was changed to [1939=100].

1941-1945

WPI:

Manila:

The blue text was interpolated using the cost of living (1) found in Nagano(2023), Table 4, Manila Price Index, 1942-1945.

US :

After organizing the WPI (1926 = 100) found in each issue of the United States Department of Commerce,

Survey of Current Business , Bureau of Foreign and Domestic Commerce (1942 March, 1943 March, 1944 March, 1945 March, 1946 March),

The base year was changed to an index with December 1941 = 100.

1946-2020

CPI :

Philippines:

Odaka (2023) 'Estimating Provisional Consumer Price Index (CPI) of The Philippines, 1902~1940' Appendix III: CPI Time-series Data Long-run Provisional CPI, 1902~2005 and Some Related Series Combined CPI [1980 In 2006, I connected [CPI est 2000=100] from the file "LgtmCnsmtn Rev2 for HARA" given by Professor Odaka to the file "CPI est 2000=100". The base year of the connected index [1980=100] was converted to [1985=100].

US :

CPI obtained from Hills, S, Thomas, R and Dimsdale, N (2016): CPI obtained from International Monetary Fund, World Economic Outlook Database, April 2023 for base year [1982-1984=100] was connected in 2015.

WPI:

Philippines:

Philippine Statistics Authority (<https://psa.gov.ph/price-indices/gwpi>) Survey of Wholesale Prices of Commodities for the Generation of General Wholesale Price Index

Central Bank of the Philippines, *1998 Anunual Report Statistical Bulletin*.

Central Bank of the Philippines, *1990 Anunual Report Statistical Bulletin* .

Central Bank of the Philippines, *Thirty-Second Annual Report 1980* .

Central Bank of the Philippines, *Statistical Bulletin Vol.xxvi December, 1974*

US:

US. Bureau of Labor Statistics, Website <http://www.bls.gov/ppi/> Producer Price Index for All Commodities (Index 1982=100) .

Department of Commerce, 1975, *Historical statistics of the United States, colonial times to 1970* , Bureau of the Census.

GDP deflator:

Philippines:

Philippine Statistics Authority (<https://psa.gov.ph/statistics/national-accounts/data-series>)

US:

Connecting the deflator [2009=100] obtained from Hills, S, Thomas, R and Dimsdale, N (2016) with the deflator [2012=100] obtained from International Monetary Fund, World Economic Outlook Database, April 2023 in 2015. did.