

EGYPT'S GROWTH PERFORMANCE UNDER ECONOMIC
LIBERALISM: A REASSESSMENT WITH NEW GDP
ESTIMATES, 1886–1945

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The stagnation of Egyptian living standards in the first half of the 20th century has been widely presumed in economic history. However, this conventional wisdom is partially based on a fragmented body of evidence on aggregate output. In particular, no estimates of national income exist for any extended period prior to World War II. Using a money-based cointegration approach and a new measure of broad money, we exploit Egypt's intimate economic links with the U.K. to provide the first continuous estimates of GDP for the period 1886–1945. Our estimates are consistent with trends in agriculture and other stylized facts about the Egyptian economy in the late 19th and early 20th century. The empirical results provide qualified support to the conventional wisdom about Egypt's growth performance in addition to offering a detailed characterization of output cycles.

1. INTRODUCTION

Ending centuries of isolation, the openness of Egypt to the world economy in the 19th century inaugurated a fundamental regime shift in Egyptian economic history. The rapid integration of the country into the expanding international commodity and capital markets set in motion an economic revolution. The development of the export-based cotton economy heralded the beginnings of modernization, leading to profound changes in political institutions, social relations and economic organization (Owen, 1993). The consequences of this revolution for Egyptian agriculture have been well documented, affecting everything from crop composition, technology of production, infrastructure development and land ownership (Richards, 1982). More importantly, this transformation led to an unprecedented improvement in Egyptian living standards from the perspective of the country's prior history and especially relative to other regions in the Middle Eastern periphery. According to O'Brien (1968), per capita output in agriculture is estimated to have risen by almost six-fold between 1820 and 1880, a pace that warrants the "appellation of agrarian revolution."

What happened to living standards at the end of the 19th century and through the first half of the 20th century is much less certain, at least quantitatively. Available indices of labor productivity in agriculture suggest that the era of rapid growth came to an end in the early 20th century (Issawi, 1961). Thereafter, rural incomes either stagnated or fell for much of the first half of the 20th century. Given the importance of agriculture, its weak performance would have affected the rest of

Note: I have received many helpful comments and suggestions at various points of completing this project from Mike Bordo, Forrest Capie, Adam Klug, Roger Owen, Les Oxley, Robert Tignor, and Jeffrey Williamson. Hend Amry provided excellent research support. The usual disclaimer applies.

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the economy. As such, the few available estimates of per capita income invariably point to stagnation in real per capita income in the first half of the 20th century (Owen and Pamuk, 1998). It took economic diversification beginning in the 1930s and state-led industrialization in the 1950s to propel the Egyptian economy into a new round of rapid economic growth (Hansen, 1991). This rough outline of Egypt's growth history in the late 19th and early 20th centuries has become widely accepted in the historical and contemporary literature.

But the conventional wisdom about Egypt's growth performance in the age of economic liberalism is based on a fragmented body of empirical evidence. In particular, the reliability of the few estimates of national income before World War II (WWII) is uncertain. Whether the stagnation in per capita income commenced in the early 20th century or after World War I (WWI) remains open to question. Moreover, existing studies do not provide an adequate characterization of output cycles in the first half of the 20th century. This essay seeks to ground the conventional wisdom on a more solid empirical footing and fill important gaps in our knowledge of Egypt's growth performance in the late 19th and early 20th centuries. We do so by providing the first continuous and statistically consistent estimates of Egyptian GDP for the period 1886–1945. To this end, we utilize a new constructed measure of broad money, together with Egypt's close economic links with the U.K., to generate money-based estimates of GDP. Following the introduction, the rest of the paper is divided as follows: Section 2 provides a literature and historical background, Section 3 covers the empirical estimation, Section 4 explores the implications of our results for Egypt's growth record, and Section 5 concludes.

2. LITERATURE AND HISTORICAL BACKGROUND

Research into living standards in Egyptian history has traditionally been hampered by the limited availability of quantitative evidence. The late 19th and early 20th centuries are no exception, in spite of the relative richness of statistical information during this period. Although data on the cotton sector were published on a regular basis since the mid-19th century, official estimates of agricultural output and national income are not available until the second half of the 20th century. Moreover, existing statistical sources do not provide an adequate basis for the direct construction of national income aggregates from either the production, income or expenditure side for any extended period prior to WWII (Hansen, 1979). Against this paucity in evidence, several attempts have been made by researchers to provide long-term indicators of agricultural output and national income. As a result, we now have several continuous indices of agricultural productivity spanning the period 1821–1960 (O'Brien, 1968; Hansen and Wattleworth, 1978).¹ By contrast, estimates of income per capita prior to WWII have only been provided for a handful of years in the interwar period and prior to

¹See Hansen and Wattleworth (1978) for a complete list of other indices of agricultural output in Egypt. Although they differ in terms of time and crop coverage, the various indices arrive at similar conclusions with regard to long-term trends in agricultural productivity. However, short-term trends can vary widely across some of the indices. Throughout this paper, we focus on Hansen and Wattleworth's (1978) index, the most recent and comprehensive of these indices.

1914.² The only index of income per capita that extends from the 19th century to WWII covers intermittent years between 1887 and 1937 (Hansen, 1979).³ Thus, while it has been possible to track the evolution of agricultural productivity since the 19th century with reasonable confidence, it is considerably more difficult to evaluate Egypt's aggregate growth performance prior to WWII. Consequently, existing assessments of long-term growth and fluctuations in output have largely been based on weak quantitative foundations.

What does the available evidence suggest concerning Egypt's growth performance in the late 19th and first half of the 20th century? Figure 1 plots Hansen and Wattleworth's (1978) index of agricultural output in 1886–1950. The index suggests that after a period of sustained expansion in the late 19th century, growth in agricultural output decelerated between 1900 and 1914, followed by a period of retardation until the early 1920s when growth resumed until the Great Depression. A recovery was under way in the mid-1930s until the outbreak of WWII, which put a severe check on agriculture expansion until the end of the war. However, because of rapid population growth starting in the early 19th century, the level of output per rural capita reached its peak at the turn of the 20th century (Figure 1). Thereafter, agricultural productivity either stagnated or fell relative to the beginning of the century, notwithstanding the brief expansions in the 1920s and 1930s. To the extent that these trends in rural per capita output reflected the returns to labor, such stagnation in living standards is corroborated by the decline of real wages for unskilled and mostly landless rural workers (Richards, 1982; Williamson, 2000).⁴ This evidence has led economists to long ago conclude that agriculture-based growth, focusing on the development and export of cotton, had reached its limits in Egypt in the early 20th century and that economic growth required diversification through industrialization (Issawi, 1961; Mabro and Radwan, 1976).⁵

Undoubtedly, the “growth crisis” in agriculture should have impacted on the rest of the economy given the size of the sector, employing around two thirds of the labor force and contributing a similar share of national output for much of the period under study.⁶ Hansen (1979) has produced an index of value added per urban capita for seven years between 1887 and 1937 using indicators of production in the trade, industry and service sectors. Combining this index of urban

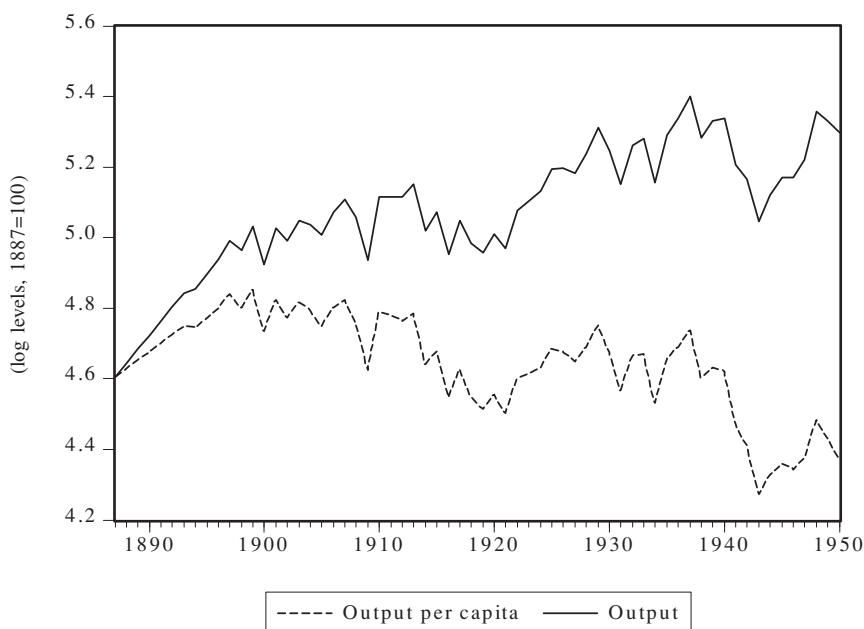
²Hansen (1974) estimated levels of real GDP per capita for five approximate dates in 1880–1914 and Sherif (1955) did the same for six dates in 1880–1950. Issawi (1961) provided an estimate of national income for 1913 and Levi (1922) did the same for 1922. Anis (1950) estimated GDP for 1937–45, which Abdel Rahman (1959) extended to 1950. Official estimates of national income were first produced in 1953 and extended back to 1945.

³Sherif's estimates (1995) of income per capita for 1880–1950 provide only one data point before 1913; the rest of the data apply to between 3 and 10 year intervals for 1921–50.

⁴Due to rapid population growth during this period, discussions of economic growth in Egypt have largely been concerned with per capita growth performance, especially in agriculture where the land constraint was increasingly binding. Thus, little distinction has been made between absolute and per capita growth performance and the link between them, although pro-Malthusian perspectives are increasingly evident in the post-WWI literature.

⁵But while there is wide agreement on the stagnation of the agriculture sector after 1914, disagreements exist on the possibility and merits of a push for industrialization prior to WWI as a means of generating growth (O'Brien, 1968, p. 194).

⁶The labor share figure is based on official employment data for the period 1907–47 while the output share is from the 1930s, the earliest years for which data are available.



Sources: Agricultural output is taken from Hansen and Wattleworth (1978, Table 3). Rural output per capita is based on rural population estimates which are taken from Egypt (various years) and Meade (1967, Table II-A-3) for 1913–1950, and Hansen (1974, Table 1) for 1885–1913.

Figure 1. Agricultural Productivity in Egypt, 1887–1950

economic activity with an index of rural value added per capita, the latter based on agricultural output, he constructed an index of real GDP per capita. The implied growth rates of Hansen’s three indices—rural, urban and total—are calculated in Table 1 as annual averages for the available dates. We augmented this index with the estimates provided by Anis (1950) of real per capita GDP growth between 1937 and 1945.

As expected, the trends in aggregate per capita output growth suggested by Hansen’s index are dominated by changes in rural per capita output: rapid growth in the late 19th century, stagnation in the early 20th century, retardation during WWI, expansion in the 1920s, and the slowdown in the 1930s. Only in the 1930s was the change in aggregate output out of line with the magnitudes suggested by rural output growth, owing to an apparent sharp decline in urban economic activity. The cycle of stagnation and recovery associated with WWI is also evident during WWII. In other sub-periods, the trend in rural output growth is mimicked in the urban sector with the result being a close relationship between productivity growth in agriculture and output growth. Thus, whether we look at agriculture or aggregate output, one arrives at the long held conjecture that the level of income per capita in Egypt experienced little or no improvement in the first half of the 20th century (Issawi, 1961).⁷

⁷In addition to trends in income, this assessment is also supported by estimates of food consumption per capita (Hansen and Wattleworth, 1978).

TABLE 1
ESTIMATES OF REAL PER CAPITA GDP GROWTH IN EGYPT,
1886–1945

Period	Total	Rural	Urban
1886–1898	2.33	3.17	0.50
1898–1912	–0.17	–0.67	0.66
1912–1920	–1.10	–1.80	–1.39
1920–1929	1.75	1.97	0.65
1929–1937	–0.76	0.89	–2.75
1937–1945	–1.21	–	–
Pre WWI (1886–1912)	0.96	1.09	0.60
Interwar period (1919–1937)	0.52	1.54	–1.0
Hansen’s period (1886–1937)	0.47	0.69	–0.30
20th century (1898–1945)	0.01	–	–
Entire period (1886–1945)	0.44	–	–

Sources: Estimates for 1887–1937 are based on Hansen (1979, Table 1), 1937–1945 on Anis (1950) as reported in Meade (1967, Table I-A-1). The nominal series have been deflated by the population series and consumer price index as explained in Table 2.

By and large, the literature has accepted the above characterization of Egyptian growth performance in the first half of the 20th century (Tignor, 1984; Owen and Pamuk, 1998). But the fragmented nature of the evidence and its weak quantitative foundations leave many questions unanswered. As those who have evaluated them would confirm, the available indices and estimates suffer from serious limitations in terms of methodology, coverage and sensitivity to underlying assumptions.⁸ In many instances, the trends in output growth implied by the estimates are inconsistent with other barometers of economic change during this period. For example, the sharp slowdown in the first decade of the early 20th century does not correspond well with evidence of continued strong growth as suggested by the rates of capital formation in agriculture, industry, and the banking and trade sectors.⁹ The same is true of the 1930s where Egypt is believed to have recovered faster from the Great Depression than is implied by Hansen’s index (Owen, 1989). More generally, the time gaps in the estimates of national income do not permit the identification of the timing and duration of economic expansions and contractions across periods, rendering them less useful for rigorous quantitative analyses.¹⁰ In the next section, we attempt to overcome these limitations by estimating the first continuous series of GDP for Egypt in the late 19th and first half of the 20th century.

⁸Although his various papers represent the best attempt to tackle the problem of estimating national income for the whole period under examination, Hansen (1979, p. 27) warns that “no serious economist or historian would or should trust a per capita income series of this caliber.” See Hansen and Marzouk (1965) and Mead (1967) for critical discussions of the various cited estimates of national income before 1950.

⁹Even the apparent stagnation in agricultural productivity before WWI has been questioned in the literature (Owen, 1969). At most, one would expect a deceleration but not a stagnation in growth between 1900 and 1914. The same is true of the late 1920s where Hansen’s index implies a much lower growth rate relative to the rising investment rates (Radwan, 1974). The same qualifications about the early 20th century and the late 1920s apply when we examine indicators of shipping and passenger traffic.

¹⁰This gap also accounts for the absence of Egypt from cross-country compendia or analyses of growth performance before WWII.

3. METHODOLOGY AND EMPIRICAL RESULTS

Since the pioneering work of Doblin (1951) and Friedman (1961), the money-based approach to estimating national income has become widely accepted, especially in settings where official data are unavailable or inadequate for the direct construction of national income aggregates. The methodology has undergone significant refinements in the past few decades, making it possible to provide conceptually and statistically consistent estimates of national income on the basis of standard monetary variables.¹¹ To briefly summarize, the starting point of the money-based approach is the quantity theory of money:

$$(1) \quad M_t V_t = P_t Q_t = Y_t$$

where M_t is a standard money aggregate, V_t is the income velocity of money, P_t is the price level, and Q_t and Y_t are, respectively, real and nominal output.¹² Given information on other monetary variables, the estimation of output is contingent upon the availability of a velocity series, V_t :

$$(2) \quad V_t = \frac{P_t Q_t}{M_t} = \frac{Y_t}{M_t}.$$

But since velocity is traditionally calculated as a residual on the basis of data on output, prices and money, researchers have been forced to devise a velocity series before estimating output. To this end, previous studies have utilized available velocity series for other countries, either directly as in Hawke (1975) and Cashin (1995) or indirectly through econometric techniques as in Rankin (1992) and Greasley and Oxley (2000). For example, while Cashin (1995) imposed Australia's velocity on its colonies to calculate the latter's output, Rankin (1992) and Greasley and Oxley (2000) generated a velocity series for New Zealand on the basis of statistical relationships between Australia's velocity and New Zealand's monetary variables. In either case, to justify using or generating one country's velocity from the other, close economic links between the countries in question provided the rationale, the assumption being that the behavior of velocity in one country followed that in the other.¹³

In this paper, we econometrically generate a velocity series for Egypt on the basis of her intimate economic and financial relationship with the U.K. starting in the 19th century and through WWII. The choice of the U.K. may appear at odds with Egypt's peripheral status, agrarian economy and geographical distance from Britain. However, the choice is borne out of the historical circumstances of the late 19th and early 20th century when Egypt was tightly linked to the U.K. through trade, capital flows and especially monetary and exchange rate policies.

¹¹The evolution of the money-based approach is best seen in the case of New Zealand where technical advances have generated a succession of studies that refined estimates of national income for the period prior to WWII (Hawke, 1975; Rankin, 1992; Greasley and Oxley, 2000). See Cashin (1995) for a recent discussion of the limitations of the money-based approach.

¹²Following the literature, we regard national income estimates generated by monetary aggregates as proxies for GDP.

¹³Alternatively, economic links between the two countries ran through the right hand side components of equation (2) and tied the behavior of velocity in both. As Greasley and Oxley (2000) have pointed out, the importance of this assumption is not often articulated statistically in an adequate manner in the literature.

As Harris (1931) noted, “Egypt is not part of the British Empire; but because of its financial relations to London, its monetary problems are similar to those of the Dominions.”¹⁴ Following the monetary reforms of 1885, Egypt adopted the Gold Standard and the Pound Sterling became the dominant currency in circulation.¹⁵ When the British-owned National Bank of Egypt was founded in 1898, it was given the power to issue legal tender while acting as a de facto central bank until the 1950s. Between 1900 and 1940, British interests contributed no less than 65 percent of the total capitalization of banks and financial institutions operating in Egypt (Crouchley, 1936).¹⁶ During WWI, Egypt followed the U.K. off the Gold Standard and adopted a Sterling standard through WWII. Since the mid-19th century, the U.K. had been Egypt’s biggest trading partner and source of external capital. These institutionalized ties, together with the exchange rate arrangements, are believed to have ensured the transmission of real as well as monetary shocks in the U.K. to Egypt (Rifaat, 1935).¹⁷ The common trends in the price series of the two countries in Figure 2, especially after 1913, are consistent with the growing historical evidence on the international transmission of inflation under fixed exchange rates (Bordo, 1985).

However strong the presumption of economic ties between Egypt and the U.K., they do not justify *a priori* the direct use of the U.K. velocity to calculate Egyptian national income. The same would hold true for other members of the British Empire. As Figure 3 highlights, although the trends in the velocity series of Australia and the U.K. were closely synchronized over the period 1890–1945, the absolute levels diverged widely at times.¹⁸ Following Greasley and Oxley (2000), we proceed in three steps: (1) we establish the existence of a long-run statistical relationship between the U.K. velocity and monetary data to validate

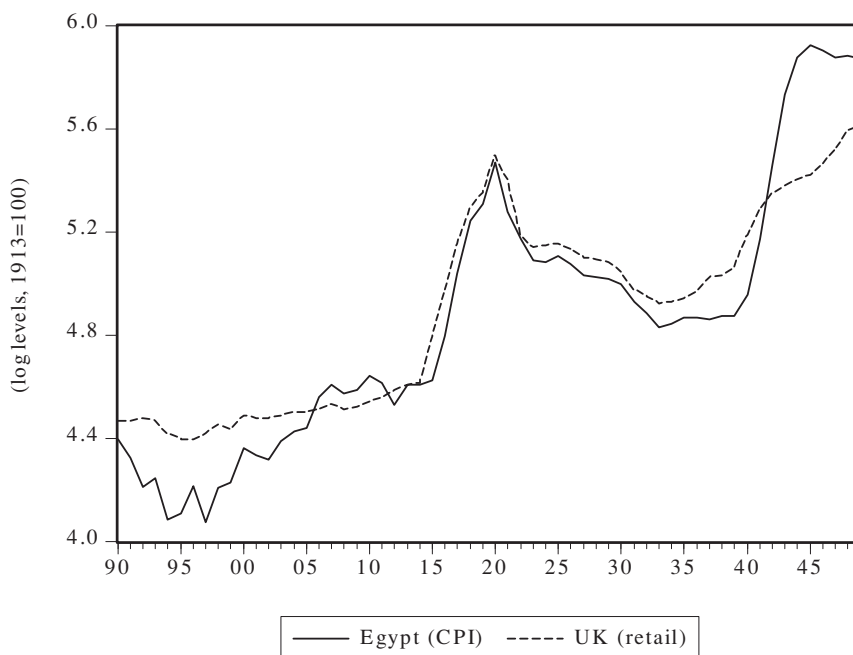
¹⁴Egypt was occupied by Britain in 1882, declared officially a protectorate in 1914, and granted independence in 1922, although Britain remained heavily involved in Egyptian affairs until 1952. Debates in Egyptian history have invariably focused on the extent of British interference in political and economic life (Tignor, 1984).

¹⁵The monetary reforms were designed, among other things, to address the multiplicity of currencies in circulation under the bimetallic system prior to 1885. Thereafter, currency in circulation consisted mainly of British sovereigns. The notes of the National Bank of Egypt became legal tender in 1898 but only widely used after 1913 with the suspension of the Gold Standard. On the monetary system of Egypt during this period see Rifaat (1935).

¹⁶In addition to the National Bank of Egypt, other important British-owned banks included Bank of Egypt, Anglo-Egyptian Bank, Bank of Abyssinia, Barclays Bank, and Ottoman Bank. Even where banks were registered locally, they tended to be owned or affiliated with international banks. The foreign monopoly in the banking sector was only broken in the 1920s. But as late as the early 1950s, of the 25 registered commercial banks and mortgage companies in Egypt, only two were locally owned (Issawi, 1954).

¹⁷Although not using this terminology, writings by economists in Egypt during this period are consistent with such an interpretation. With reference to the monetary conditions during and after WWI, the Kemmerer-Vissering Commission cited the Egyptian Finance Minister for claiming that “the bond [between Britain and Egypt] was so close that Egyptians were unable to free themselves” (Harris, 1931, p. 494). Rifaat (1935) in particular discusses the consequences of Egypt’s decision to peg its currency to the pound sterling: like Britain, Egypt faced high inflation during WWI, suffered steep deflation at the end of the war and a recession in 1920–21. The same has been noted concerning the deflation of the 1930s and the inflation of the 1940s (Issawi, 1963, pp. 246–47).

¹⁸But it is precisely these co-movements that lend support to the statistical modeling of one country’s velocity on the basis of another with whom it shares common underlying monetary conditions. The lower volatility of Australia’s velocity is consistent with the weakened “automatic system” of monetary expansion, which allowed it, among other things, to maintain stable prices (Harris, 1931, pp. 483–92).



Sources: See sources in Table 2.

Figure 2. Prices in Egypt and the U.K., 1890–1950

the use of the money-based approach; (2) we test for the existence of a similar relationship between the U.K. velocity series and Egyptian monetary variables; and (3) we exploit the latter relationship to generate a velocity series for Egypt which we use to estimate nominal GDP for Egypt. The data used in the paper covers the period 1885–1950.¹⁹ The U.K. variables consist of broad money or M3 ($M3_{UK}$), retail prices (P_{UK}) and velocity (V_{UK}). For Egypt, we have constructed an M3 money aggregate per capita ($M3_{EG}$) on the basis of published data on currency and notes in circulation, and time and demand deposits by the private and public sectors with the banking system.²⁰ No aggregate other than currency in circulation has been calculated for Egypt prior to 1945.²¹ Egyptian

¹⁹It is not possible to extend the analysis prior to 1885 as we lack any reliable data on the components of money supply. The monetary reforms of 1885 inaugurated the systematic gathering and reporting of data on currency in circulation and deposits on a regular basis.

²⁰For 1885–1945, notes and coin in circulation (gold, silver and bronze) are taken from Egypt (various years). For 1901–50, demand and time deposits by the private sector with the banking system including the Post Office Savings, are taken from Egypt (various years); beginning in 1920, we added Bank Misr (1972). Prior to 1900, we were limited by data published by four banks where small sums of deposits were held. Public sector deposits with the banking system for 1885–98 were based on information in Statistical Returns (1899); for 1898–1950, they were taken from the National Bank of Egypt (1949) and Egypt (various years).

²¹We have chosen to construct an M3 money aggregate for Egypt in part because it is the only available broad money aggregate for the U.K. on a continuous basis since 1870. At this point, we are unable to produce a narrow money aggregate for Egypt because we cannot disaggregate deposits into their demand and time components, the same problem faced by Capie and Weber (1985) in calculating money aggregates for the U.K.



Sources: See Table 2 for sources of U.K. M3 velocity. Australia's velocity is based on the GDP (Table ANA 50-64) and M2 (Table PF 57-63) series in Vamplew (1987).

Figure 3. Velocity of Money in Australia and the U.K., 1890–1945

government publications provided two price series, a wholesale price index (WP_{EG}) for 1895–1950 and the Consumer Price Index (CPI_{EG}) for 1913–50 that we extended back to 1885.

We begin with an examination of the statistical properties of the monetary variables for the U.K. and Egypt to determine the appropriate econometric technique. As Table 2 makes clear, all variables under consideration for the two countries are non-stationary; the Augmented Dickey–Fuller and Phillips–Perron tests fail to reject the presence of a unit-root in the levels of each series. Thus, Ordinary Least Squares (OLS) would not be the appropriate technique for completing the steps required for generating a velocity series for Egypt.²² On the other hand, the tests of the same variables in first differences reject the hypothesis of non-stationary, and thus justify a cointegration-based approach. We employ Johansen's (1988) Maximum Likelihood (ML) cointegration methodology. Table 3 presents the cointegration tests using the trace and maximal eigenvalue test statistics. In panel A we establish the existence of a long-run relationship between the U.K. monetary variables: V_{UK} , M_{UK} , and P_{UK} . Panels B and C of Table 3

²²This issue goes to the heart of Greasley and Oxley's (2000) critique of Rankin (1992) who employs OLS to analyze non-stationary variables. However, since an OLS regression would consistently estimate a cointegration relationship if it existed for the New Zealand data, Rankin's work was still open to other criticisms such as imposing structural discontinuities and making *ad hoc* adjustments to regression estimates to fit prior assumptions.

TABLE 2
UNIT ROOT TESTS FOR EGYPTIAN AND U.K.
MONETARY VARIABLES, 1886–1950

Variables	ADF (L)	PP(L)
<i>A. Variables in levels</i>		
V_{UK}	-2.22 (2)	-2.77 (3)
P_{UK}	-2.41 (2)	-1.93 (3)
$M3_{UK}$	-2.11 (2)	-1.93 (3)
WP_{EG}	-1.78 (2)	-1.94 (3)
CPI_{EG}	-2.17 (3)	-1.69 (3)
$M3_{EG}$	-2.46 (2)	-2.00 (3)
<i>B. Variables in first differences</i>		
V_{UK}	-5.19 (2)**	-5.49 (3)**
P_{UK}	-3.22 (2)*	-3.96 (3)**
M_{UK}	-3.24 (2)*	-3.28 (2)*
WP_{EG}	-3.74 (2)**	-7.47 (3)**
CPI_{EG}	-3.22 (3)*	-6.19 (3)**
$M3_{EG}$	-4.28 (2)**	-5.50 (3)**

Notes: The U.K. variables are velocity, M3 and retail prices; the Egyptian variables consist of M3 per capita, wholesale prices and consumer prices. ADF and PP are, respectively, the Augmented Dickey-Fuller and Phillips-Perron test statistics. L denotes the proper lag order based on the AIC criterion. ** and * imply rejection of the null hypothesis of non-stationarity at the 5% and 10% level, respectively.

Sources:

Egypt: Consumer prices (1913 = 100) are taken from the annual index in Egypt (various years) for 1913–50. For 1885–1913, we took a weighted average of wholesale prices (0.5), prices of textiles (0.3) and other imports (0.2) calculated by Hansen (1974, Table V). Wholesale prices (1913 = 100) are taken from the annual index in Egypt (various years) for 1913–1950. For 1895–1913, we extended the index using wholesale prices for 10 commodities reported in Egypt (1914, Table VI); for 1885–95, we used Hansen's (1974, Table V) index of export commodities. M3 is constructed as explained in footnote 20 and deflated by population estimates from Egypt (various years).

U.K.: For the entire period 1885–1950, the M3 series is taken from Capie and Webber (1985, Table I.3); velocity is from Capie and Webber (1985) based on the M3 series and the nominal GNP series of Feinstein (1971, Table 1); and retail prices are taken from Feinstein (1971, Table 65).

show the cointegration tests between the U.K. velocity and the Egyptian monetary variables: V_{UK} , M_{EG} , and CPI_{EG} ; and V_{UK} , M_{EG} , and WP_{EG} . Regardless of which Egyptian price variable we used, the evidence supports the existence of an equilibrium long-run relationship between the variables.

Table 4 compares the ML normalized cointegrating vectors between the U.K. velocity and Egyptian monetary variables from Table 3 with those obtained by the Phillips and Hansen (1990) Fully Modified OLS approach.²³ The coefficients of the cointegrating vector are broadly similar using both approaches. But the price coefficients in the relationship vary depending on the Egyptian price variable

²³Given that the ML tests indicates the existence of multiple cointegrating vectors between U.K. velocity and Egypt's monetary variables, we choose the vector whose coefficients and sign conforms to theoretical predictions.

TABLE 3
MAXIMUM LIKELIHOOD COINTEGRATION TESTS, 1886–1950

Null Hypothesis	Trace		Maximal Eigenvalue	
	Alternative Hypothesis	Test Statistic	Alternative Hypothesis	Test Statistic
<i>A. Cointegrating system: U.K. velocity, M3 and prices</i>				
$r = 0$	$r = 1$	43.1*	$r \geq 1$	38.4*
$r \leq 1$	$r = 2$	4.64	$r \geq 2$	4.59
$r \leq 2$	$r = 3$	0.05	$r = 3$	0.05
<i>B. Cointegrating system: U.K. velocity, Egyptian M3 and CPI</i>				
$r = 0$	$r = 1$	46.79*	$r \geq 1$	29.11*
$r \leq 1$	$r = 2$	17.68*	$r \geq 2$	17.64*
$r \leq 2$	$r = 3$	0.04	$r = 3$	0.04
<i>C. Cointegrating system: U.K. velocity, Egyptian M3 and WP</i>				
$r = 0$	$r = 1$	39.34*	$r \geq 1$	24.49*
$r \leq 1$	$r = 2$	14.84*	$r \geq 2$	14.80*
$r \leq 2$	$r = 3$	0.005	$r = 3$	0.005

Notes: See Table 2 for variable definitions and sources. Using the AIC procedure, we found two annual lags to be appropriate for Panel A and one for Panels B and C. The test statistics are compared to the asymptotic critical values obtained from Osterwald-Lenum (1992). *Indicates significance at the 5% level.

TABLE 4
COINTEGRATION VECTORS FOR U.K. VELOCITY AND EGYPTIAN MONEY AND PRICE VARIABLES, 1886–1950

Variable	Cointegration Approach		Variable	Cointegration Approach	
	ML (1)	PH (2)		ML (3)	PH (4)
V_{UK}	–	–	V_{UK}	–	–
$M3_{EG}$	–0.48	–0.48	$M3_{EG}$	–0.76	–0.54
CPI_{EG}	0.24	0.32	WP_{EG}	0.74	0.42
Constant	–0.34	–0.12	Constant	–1.51	–0.56

Notes: The Maximum Likelihood (ML) vectors are based on the normalized vectors in panels B and C of Table 3. The Philips and Hansen (PH) vectors are based on their Fully Modified OLS cointegration approach. See Table 2 for variable definitions and sources.

used. This is largely due to the higher volatility of the wholesale price index for Egypt, WP_{EG} , whose movements are dominated by cotton and food prices. Since consumer prices tend to reflect more accurately cost of living conditions, we focus on the velocity series generated from the cointegration relationship employing the CPI in columns 1 and 2 of Table 4.²⁴ With these vectors, it is straightforward to generate velocity series for Egypt.²⁵ We combined the velocity series implied by

²⁴The Consumer Price Index for Egypt (CPI_{EG}) includes food, clothing, transportation, housing and some durable goods whereas the wholesale price index (WP_{EG}) covers only agricultural crops.

²⁵Consistent with trends elsewhere, Egypt's estimated velocity displays the initial phase of the commonly found U-shaped pattern, declining from the late 19th century until WWII (Bordo and Jonung, 1987). As in the case of Australia, the estimated velocity series for Egypt follows the U.K. series, especially during periods of major monetary disturbances around WWI, the post-WWI deflation, the Great Depression and WWII.

column 2 with the Egyptian money aggregate ($M3_{EG}$) to produce a continuous series of nominal GDP per capita, and deflated the latter by the CPI to arrive at real GDP per capita for the period 1886–1945. Table A1 (Appendix) reports the estimated nominal and real GDP series in aggregate and per capita terms.

4. IMPLICATIONS FOR EGYPT'S GROWTH HISTORY

What are the implications of our GDP estimates for Egypt's growth history? In Table 5 we calculated the growth rates of real per capita GDP based on our preferred empirical model; in order to facilitate comparison, we present our results alongside those given by previous studies in Table 1. Notwithstanding the different methodologies, there is agreement between the estimates on the general trends of per capita GDP growth across most periods. Egypt's growth performance broadly follows the contours of the conventional wisdom: rapid growth in the late 19th century, deceleration in the early 20th century, retardation during WWI, post-War recovery followed by a slowdown in the 1930s, and finally the retardation during WWII. However, the magnitudes of expansions and contractions in some sub-periods differ significantly in our study from earlier work. Consequently, our characterization of Egypt's growth performance in the late 19th and early 20th century diverges in important ways from the literature.

TABLE 5
COMPARISONS OF REAL PER CAPITA GDP GROWTH IN
EGYPT, 1886–1945

Period	Previous studies	This paper
1886–1898	2.33	2.90
1898–1912	-0.17	1.44
1912–1920	-1.10	-1.70
1920–1929	1.75	1.82
1929–1937	-0.76	0.52
1937–1945	-1.21	-0.90
Pre WWI (1886–1912)	0.96	2.52
Interwar period (1919–1937)	0.52	0.75
Hansen's period (1886–1937)	0.47	1.42
20th century (1898–1945)	0.01	0.41
Entire period (1886–1945)	0.44	1.11

Notes: The estimates for previous studies come from Table 1. The estimates of this paper are calculated using the cointegration vector in column 2 of Table 4. The generated velocity series for Egypt was multiplied by M3 per capita and deflated by consumer prices. The entire GDP series is presented in Table A1 (Appendix).

The most significant differences between the estimates concern the early 20th century where we suggest continued strong growth (1.44 percent versus -0.17 percent per annum), and the 1930s where our model implies a slowdown but not a retardation (0.52 percent versus -0.76 percent per annum). However, while the upward adjustment of growth rates in the early 20th century improves the growth performance in the pre-WWI period, the same adjustment we make in the 1930s does not affect the interwar period in part because our model suggests a bigger

slowdown during WWI. Our growth estimates for the late 1930s through 1945 are in line with previous work. As a result, the historical claim that income per capita improved little or not at all in the first half of the 20th century is supported by our results. But our estimates imply a better overall growth performance for the entire period of 1886–1945, an annual 1.11 percent growth of real per capita GDP compared to the reported estimate of 0.44 percent. Excluding WWII, the overall growth performance rises to 1.42 percent per annum compared to 0.47 percent. Furthermore, given that our estimates and Hansen's agree on the interwar record, there is little doubt that this sub-period is responsible for the stagnation in living standards in the first half of the 20th century.²⁶

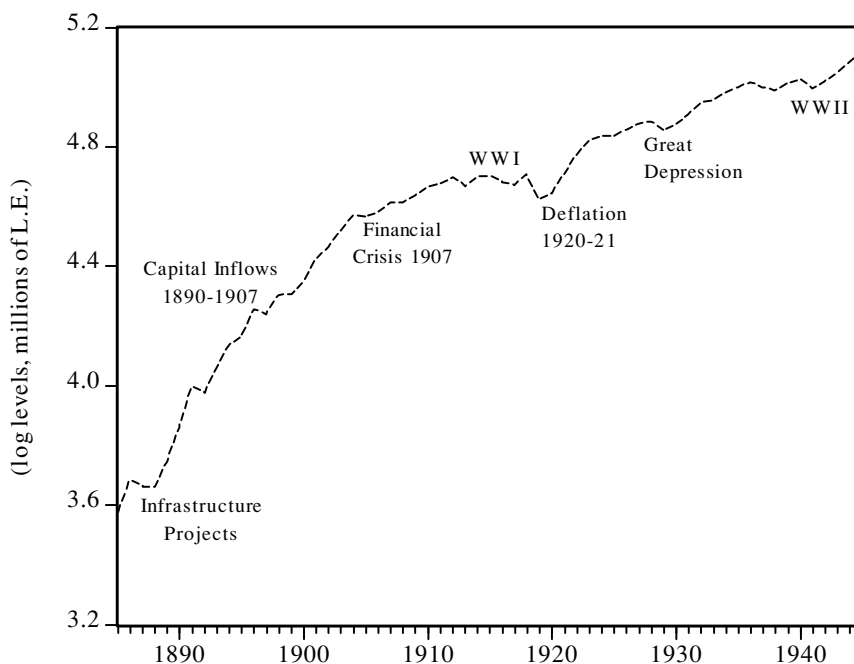
The differences between our estimates and previous work become clear when comparing the levels of real per capita GDP. Table A1 (Appendix) presents our estimated real per capita GDP series along with various reported estimates in the literature, all of which have been deflated by the consumer price index and the population series used in this paper. In line with his growth characterization, Hansen (1974) appears to have overestimated national income in 1896 and 1901 while coming very close to our estimates in 1904 and 1909. As a result, his estimates imply little improvement in per capita income in the first decade of the 20th century. Issawi's (1961) estimate for 1913 is extremely close to our estimate for that year. In contrast, Levi's (1922) estimate for 1922, considered unrealistically high in previous studies, is also too high from the perspective of our series. The 1937–45 estimates by Anis (1950) are comparable with what we project, and are virtually identical with the fluctuations in our series. All the estimates, including ours, agree that income per capita stagnated between 1913 and 1945 and that relative to 1900, income per capita was not higher in 1945.²⁷

The availability of a continuous real GDP series enables us to do more than just assess the long-term growth performance of Egypt. In particular, we can measure with greater precision the timing of output cycles and link them directly with established facts in Egyptian economic history. Figure 4 plots our estimated real GDP series highlighted by major turning points in growth trends. As expected, the late 19th century was characterized by rapid economic growth following the completion of major infrastructure investments in agriculture, together with massive inflows of foreign capital into the rest of the economy (Crouchley, 1936). Rapid growth, albeit at a slower rate, was sustained in the early 20th century by continued inflows of foreign capital until 1907–09 when a combination of a bad cotton crop and a financial crisis led to a slowdown until WWI (Owen, 1969). Thus, in line with the historical record, the presumed stagnation in agriculture in the first decade of the 20th century is not reflected in aggregate output growth, notwithstanding the impact of the 1907–09 events.

The slowdown in real output growth during WWI is consistent with the record of falling exports, import shortages and high inflation (Issawi, 1963).

²⁶Elsewhere we have shown, based on trends in capital formation in agriculture and industry, that the Egyptian economy was starved for capital in the interwar period and, as a result, output must have stagnated (Yousef, 2001).

²⁷We have excluded from these comparisons Sherif's (1955) estimates because they are centered on wide time intervals; suffice it to say that his projections after 1929 are closer to our results than for earlier dates.



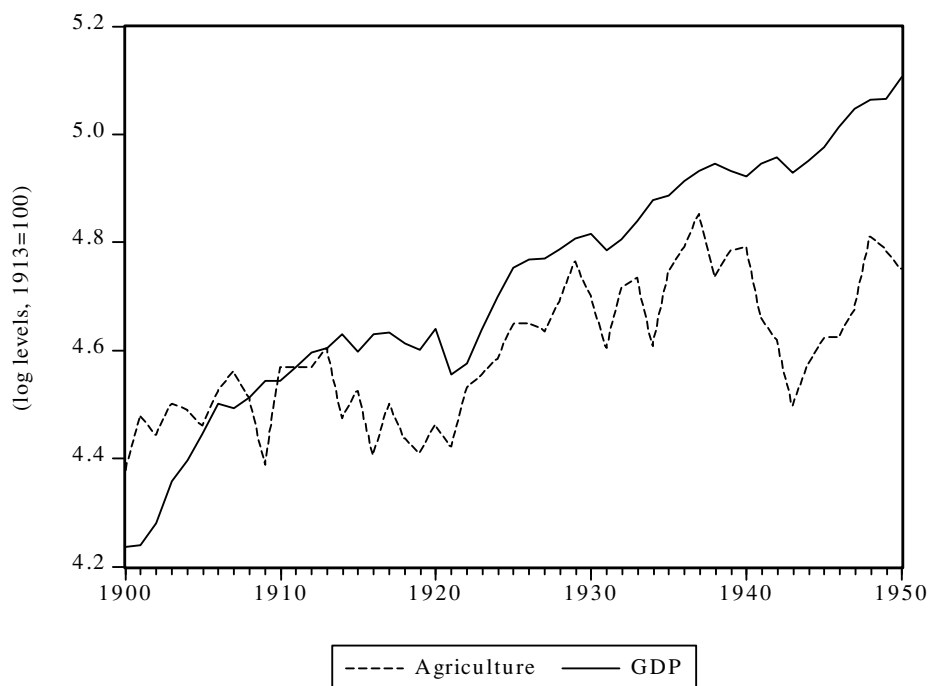
Sources: Our series is based on the empirical results in column 2 of Table 4 and reported in column 2 of Table A1 (Appendix).

Figure 4. Real GDP Estimates for Egypt, 1886–1945

Mirroring the experience of the U.K., the end of the Great War released pent up demand and accumulated trade surpluses. But the expansion was inflationary resulting in little growth in real terms and paving the way for a steep slump in 1920–21.²⁸ The recovery in cotton exports after 1921 helped propel the economy into a strong recovery that found additional stimulus in the steady growth in industry and banking (Radwan, 1974). The collapse of international cotton prices in 1929 should have led to a slowdown and that is clearly displayed in Figure 4. But the effects of the Great Depression were partially muted by the impact of industrial protection and the extension of price supports to cotton cultivators early in the 1930s (Yousef, 2000).²⁹ The negative effects of WWII are reflected in the fall of output as Egypt was once again cut off from world markets, enduring a period of shortages and inflation.

²⁸The 1920–21 slump is considered Britain’s worst recession in the 20th century, attributed in part to deflationary monetary policy (Broadberry, 1986, p. 165).

²⁹Owen (1989) analyzes in great detail the policy response and performance of the Egyptian economy during the Great Depression. The financial impact of the fall in cotton prices was offset by extensive government assistance to cultivators in the form of debt relief from mortgage payments in 1929 and large reductions in taxes owed to the government in 1933–34. As a result, by 1932 cotton output and total agricultural production had recovered. In parallel, the tariff reforms of 1930 afforded industry, especially textiles, greater protection. Local consumption of cotton increased fivefold between 1929 and 1933. In this regard, Egypt’s policy stance is reminiscent of activist Latin American countries analyzed by Diaz-Alejandro (1984).



Sources: Real GDP is based on the empirical results reported in Table A1 (Appendix). See Figure 1 for agricultural output.

Figure 5. Agriculture and National Income in Egypt, 1900–1950

Finally, as is visibly clear in Figure 5, Egypt’s growth performance throughout this period was intimately tied to agriculture in spite of private initiatives and policy steps to diversify the economy in the 1920s and 1930s.³⁰ Notwithstanding the dependence on agriculture, we find evidence that output cycles in agriculture were longer and deeper than the rest of the economy, reflecting the volatility of cotton prices and the exposure of Egyptian agriculture to these external shocks. On average, recessions cost agriculture around 8 percent of potential output, with the costs above 12 percent during the wars and the Great Depression. By comparison, such costs amounted to less than 5 percent of potential output for the whole economy on average. Where economic diversification seemed to have paid off was in shortening the duration of economy-wide recessions. This was especially evident during the wars and Great Depression where economic activity in other sectors picked up within three years while agriculture experienced slumps lasting up to five years.

Does our money-based methodology account for Egypt’s growth performance after 1945? Extending our forecast to the post-WWII period yields point

³⁰This is confirmed by preliminary vector-autoregression analysis of movements in GDP and agricultural output. The discussion of the duration and costs of cycles that follows is based on using a Hodrick-Prescott Filter to estimate potential agricultural and aggregate output, and measuring the deviations from these estimated levels. To conserve on space, we have not reported these results.

estimates of real GDP that are significantly different from what has been reported in the literature, although our methodology accounts fairly well for the presumed pattern of the business cycle between 1945 and 1960.³¹ This is hardly surprising given that the post-WWII period represents a fundamental regime shift in the policy orientation of the Egyptian economy. Most importantly, the very monetary links between Egypt and the U.K. that underpinned our methodology for the earlier period begin to breakdown after WWII with the departure of Egypt from the Sterling Area in 1947, the introduction of foreign exchange controls and the end of automatic Sterling Convertibility in 1948 (National Bank of Egypt, 1949).³² All of these measures implied the end of the tight monetary link between Egypt and the U.K. But the 1950s witnessed an even more fundamental change in Egypt, namely the birth of the import-substitution and state-led model of development which resulted, among other things, in the nationalization of the banking system, price controls and the management of external trade (Hansen and Marzouk, 1965).

5. CONCLUSION

Using a money-based approach, we exploited Egypt's economic ties with the U.K. to estimate the first continuous GDP series for the period 1886–1945. Our GDP estimates track short-term and long-term trends in agricultural output, and they are consistent with other stylized facts in Egyptian economic history. More importantly, the estimates shed light on important issues concerning Egypt's growth record in the late 19th and early 20th century. Contrary to the conventional wisdom, relative to the late 19th century, income per capita growth decelerated but did not stagnate in the early 20th century. The interwar period was marked by a weak growth performance such that the widely held belief that real income per capita stagnated in the first half of the 20th century is largely supported by our empirical estimates.

APPENDIX

Nominal and Real GDP Estimates for Egypt, 1886–1945, are given in Table A1.

³¹There exist multiple estimates of real GDP for this period, using different methodologies and price deflators to arrive at different estimates. No serious attempt has been made to reconcile or assess the growth performance implied by these estimates (Mead, 1967).

³²To be precise, these developments were the result of wartime measures to conserve on foreign exchange by making Sterling Area countries surrender their earnings into a common pool managed by London. Unable to convert or use these accumulated balances after 1945, Egypt opted out of the Sterling Standard and was forced to negotiate the gradual release of its balances with London. As a result, Egypt switched from Sterling to Government Treasury Bills for backing its monetary base.

TABLE A1
NOMINAL AND REAL GDP ESTIMATES FOR EGYPT, 1886-1945

	New Estimates				Previous Studies Real GDP per capita (L.E.)
	Nom. GDP (millions L.E.)	Real GDP (millions L.E.)	Nom. GDP per capita (L.E.)	Real GDP per capita (L.E.)	
1886	27.05	35.79	3.62	4.78	
1887	31.08	39.93	4.06	5.21	
1888	31.34	38.92	4.00	4.96	
1889	32.38	38.91	4.03	4.84	
1890	34.33	42.40	4.17	5.16	
1891	35.81	47.54	4.25	5.65	
1892	36.58	54.31	4.24	6.30	
1893	37.14	53.23	4.21	6.03	
1894	34.51	58.17	3.82	6.43	
1895	38.09	62.69	4.11	6.77	
1896	43.49	64.44	4.59	6.80	8.71
1897	41.27	70.36	4.25	7.25	
1898	46.47	69.25	4.71	7.03	
1899	50.74	74.02	5.07	7.40	
1900	58.19	74.26	5.73	7.31	
1901	58.98	77.40	5.72	7.51	8.63
1902	62.69	83.60	5.99	7.99	
1903	69.90	86.99	6.58	8.19	
1904	76.50	91.39	7.09	8.47	
1905	81.74	96.54	7.47	8.82	
1906	91.48	95.81	8.23	8.62	8.47
1907	97.85	97.65	8.67	8.66	
1908	97.59	100.78	8.55	8.83	
1909	99.03	100.78	8.57	8.72	
1910	107.09	103.22	9.15	8.82	
1911	107.09	106.16	9.04	8.96	8.19
1912	105.49	107.10	8.80	8.93	
1913	109.77	109.77	9.04	9.04	9.89
1914	106.33	106.33	8.65	8.65	
1915	112.01	109.82	9.01	8.83	
1916	133.38	110.23	10.59	8.76	
1917	166.28	107.98	13.05	8.47	
1918	201.71	106.72	15.66	8.28	
1919	224.19	110.98	17.21	8.52	
1920	241.70	101.98	18.36	7.75	
1921	203.74	103.95	15.31	7.81	
1922	194.77	110.67	14.47	8.22	12.71
1923	190.68	117.70	14.02	8.65	
1924	199.81	124.11	14.53	9.02	
1925	208.17	126.16	14.97	9.07	
1926	201.96	126.22	14.37	8.98	
1927	196.64	128.52	13.84	9.04	
1928	199.31	131.13	13.87	9.12	
1929	199.58	132.18	13.73	9.09	
1930	189.85	128.28	12.91	8.72	
1931	180.57	130.85	12.14	8.80	
1932	178.77	135.43	11.88	9.00	
1933	175.95	140.76	11.56	9.25	
1934	180.11	141.82	11.70	9.22	
1935	189.64	145.88	12.18	9.37	
1936	193.04	148.50	12.26	9.43	
1937	194.38	150.68	12.21	9.46	8.13
1938	194.42	148.41	11.99	9.16	7.96
1939	192.59	147.01	11.67	8.91	7.87
1940	213.71	150.50	12.73	8.96	8.18

TABLE A1—continued

	New Estimates				Previous Studies Real GDP per capita (L.E.)
	Nom. GDP (millions L.E.)	Real GDP (millions L.E.)	Nom. GDP per capita (L.E.)	Real GDP per capita (L.E.)	
1941	268.23	152.40	15.69	8.92	7.94
1942	347.16	147.94	19.95	8.50	8.30
1943	466.76	151.23	26.35	8.54	7.26
1944	552.21	155.19	30.63	8.61	7.40
1945	602.23	161.16	32.82	8.78	7.54

Notes: The real GDP series is given in 1913 prices. L.E. is the Egyptian pound, roughly equivalent to the U.K. pound.

Source: The estimates of this paper are calculated using the cointegration vector in column 2 of Table 4, deflated when relevant by population and consumer prices. Previous estimates have been deflated by the same population and price indices and come from the following sources: Hansen (1974) for 1896–1911, Issawi (1961) for 1913, Levi (1922) for 1922 and Anis (1950) for 1937–1945.

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