

**EGYPT'S GROWTH PERFORMANCE  
UNDER ECONOMIC LIBERALISM: A  
REASSESSMENT WITH NEW GDP  
ESTIMATES, 1885-1945**

Tarik M. Yousef

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## **Abstract**

Following a period of rapid growth in the late 19th century, Egyptian real per capita income stagnated in the first half of the 20th century. This widely accepted belief is based on trends in agricultural productivity but a fragmented body of evidence on aggregate output. In particular, no estimates of national income exist for any extended period prior to WWII. Using a money- based cointegration approach and a new measure of broad money, we exploit Egypt's intimate economic links with the UK to provide the first continuous estimates of GDP for the period 1885-1945. Our estimates are consistent with trends in agriculture and other stylized facts about the Egyptian economy in the late 19th and first half of the 20th century. The empirical results provide support and some qualification to the conventional wisdom about Egypt's growth performance in addition to offering a detailed characterization of output cycles.

## 1. Introduction

Following centuries of isolation, the openness of Egypt to the world economy in the 19<sup>th</sup> 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, and as a result of this transformation, Egyptian per capita income expanded in the 19<sup>th</sup> century on a scale unprecedented from the perspective of Egypt's prior history and especially relative to other regions in the Middle Eastern periphery (O'Brien, 1968).<sup>1</sup>

What happened to national income at the end of the 19<sup>th</sup> century and through the first half of the 20<sup>th</sup> 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 20<sup>th</sup> century (Issawi, 1961). Thereafter, rural incomes either stagnated or fell for much of the first half of the 20<sup>th</sup> century. Given the importance of agriculture, its weak performance would have affected the rest of the economy. As such, the few available estimates of national income per capita invariably point to stagnation in real per capita income in the first half of the 20<sup>th</sup> 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 19<sup>th</sup> and early 20<sup>th</sup> centuries, when the country was integrated into the world economy and the government exercised limited policy influence, 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 WWII is uncertain. Whether the stagnation in per capita income commenced in the early 20<sup>th</sup> or after WWI remains open to question. Moreover, existing studies do not provide an adequate characterization of output cycles in the first half of the 20<sup>th</sup> 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

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<sup>1</sup> Output per capita in agriculture is estimated to have grown five fold between 1820 and 1880, a pace that warrants the "appellation of agrarian revolution" according to O'Brien (1968, p.193).

performance in the late 19<sup>th</sup> and early 20<sup>th</sup> centuries. We do so by providing the first continuous and statistically consistent estimates of Egyptian GDP for the period 1885-1945. To this end, we utilize a new constructed measure of broad money together with Egypt's close economic links with the UK 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 19<sup>th</sup> and early 20<sup>th</sup> centuries are no exception, in spite of the relative richness of statistical information. Although data on the cotton sector was published on a regular basis since the mid-19<sup>th</sup> century, official estimates of agricultural output and national income are not available until the second half of the 20<sup>th</sup> 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).<sup>2</sup> 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 1914.<sup>3</sup> The only index of income per capita that extends from the 19<sup>th</sup> century to WWII covers intermittent years between 1887 and 1937 (Hansen, 1979).<sup>4</sup> Thus, while it has been possible to track the evolution of agricultural productivity since the 19<sup>th</sup> century with reasonable confidence, it has been considerably more difficult to assess the aggregate growth performance of Egypt prior to WWII. Consequently, existing assessments of the long-term growth record and fluctuations in national income have largely been based on weak quantitative foundations.

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<sup>2</sup> See 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.

<sup>3</sup> Hansen (1974) estimated levels of real GDP per capita for 5 approximate dates in 1880-1914 and Sherif (1955) did the same for 6 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.

<sup>4</sup> Sherif (1955)'s estimates 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.

What does the available evidence suggest concerning Egypt's growth performance in the late 19<sup>th</sup> and first half of the 20<sup>th</sup> 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 19<sup>th</sup> century, growth in agricultural output decelerated between 1900 and 1914, followed by a period of retardation until the mid-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 agricultural expansion until the end of the war. However, because of rapid population growth starting in the early 19<sup>th</sup> century, the level of output per rural capita reached its peak at the turn of the 20<sup>th</sup> 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 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).<sup>5</sup> This evidence has led economists to conclude long ago that agriculture-based growth, focusing on the development and export of cotton, had reached its limits in Egypt in the early 20<sup>th</sup> century and that economic growth required diversification through industrialization (Issawi, 1961; Mabro and Radwan, 1976).<sup>6</sup>

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 significant share of national output for much of the period under study.<sup>7</sup> 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 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.

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<sup>5</sup> Due 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.

<sup>6</sup> But 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 way to generate growth (O'Brien 1968, p.194).

<sup>7</sup> The 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 is available.

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 19<sup>th</sup> century, stagnation in the early 20<sup>th</sup> 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 in 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 aggregate output growth. Thus, whether we look at agriculture or aggregate output, one arrives at a long held conjecture, that the level of income per capita in Egypt experienced little or no improvement in the first half of the 20<sup>th</sup> century (Issawi, 1961; O'Brien, 1968).<sup>8</sup>

By and large, the literature has accepted the above characterization of Egyptian growth performance in the first half of the 20<sup>th</sup> century (Tignor, 1984; Owen and Pamuk, 1998). But the fragmented nature of the evidence and its weak quantitative foundations leave open many questions. 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.<sup>9</sup> 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 20<sup>th</sup> century does not correspond well with evidence of continued strong growth that is suggested by the rates of capital formation in agriculture, industry, and the banking and trade sectors.<sup>10</sup> 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 estimates of national income do not permit identification of the timing and duration of economic expansions and contractions across periods, rendering them less useful

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<sup>8</sup> In addition to trends in income, this assessment is also supported by estimates of food consumption per capita (Hansen and Wattleworth, 1978).

<sup>9</sup> Although his various papers represents 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.

<sup>10</sup> Even the apparent stagnation in agricultural productivity before WWI has been questioned (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 early 20<sup>th</sup> century and the late 1920s apply when we examine indicators of shipping and passenger traffic.

for rigorous quantitative analyses.<sup>11</sup> In the next section, we attempt to overcome these limitations by estimating the first continuous series of GDP for Egypt in the late 19<sup>th</sup> and first half of the 20<sup>th</sup> century.

### 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 is 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.<sup>12</sup> To briefly summarize, the starting point of the money-based approach is the quantity theory of money:

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

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.<sup>13</sup> Given information on other monetary variables, the estimation of output is contingent upon the availability of a velocity series,  $V_t$ :

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

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

<sup>11</sup> This gap also accounts for the absence of Egypt from cross-country compendia or analyses of growth performance before WWII.

<sup>12</sup> The 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.

<sup>13</sup> Following the literature, we regard the national income estimates generated by monetary aggregates as GDP.

the countries in question formed the basis, the assumption being that the behavior of velocity in one country followed that in the other.<sup>14</sup>

In this paper, we econometrically generate a velocity series for Egypt on the basis of her intimate economic and financial relationship with the UK starting in the 19<sup>th</sup> century and through WWII. The choice of the UK 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 19<sup>th</sup> and early 20<sup>th</sup> century when Egypt was tightly linked to the UK through trade, capital flows and especially monetary and exchange rate policies. 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".<sup>15</sup> Following the monetary reforms of 1885, Egypt adopted the Gold Standard and the Pound Sterling became the dominant currency in circulation.<sup>16</sup> 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).<sup>17</sup> During WWI, Egypt followed the UK off the Gold Standard and adopted a Sterling standard through WWII. Since the mid-19<sup>th</sup> century, the UK had been Egypt's biggest trading partner and source of external capital.

These ties together with the exchange rate arrangements are believed to have ensured the transmission of real as well as monetary shocks in the UK to Egypt

<sup>14</sup> Alternatively, 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.

<sup>15</sup> Egypt 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).

<sup>16</sup> The 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).

<sup>17</sup> In 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 twenty-five registered commercial banks and mortgage companies in Egypt, only two were locally owned (Issawi, 1954).

(Rifaat, 1935).<sup>18</sup> 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 UK, they do not *a priori* justify the direct use of the UK velocity to calculate Egyptian national income. The same would hold true for other parts of the British Empire. As Figure 3 highlights, although the trends in the velocity series of Australia and the UK were closely synchronized over the period 1890-1945, the absolute levels diverged widely at times.<sup>19</sup> Following Greasley and Oxley (2000), we proceed in three steps: (1) we establish the existence of a long-run statistical relationship between the UK velocity and monetary data to validate the use of the money-based approach; (2) we test for the existence of a similar relationship between the UK 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.<sup>20</sup> The UK 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.<sup>21</sup> No aggregate other than currency in circulation has

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<sup>18</sup> Although 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 a 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, p. 246-47).

<sup>19</sup> But 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.483-492).

<sup>20</sup> It 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.

<sup>21</sup> For 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 from Bank Misr (1972). Prior to 1900, we were limited by data published by 4 banks where small sums of deposits were held. Public sector deposits with the banking system were taken for 1885-98 from Statistical Returns (1899) and for 1898-1950 from the National Bank of Egypt (1948) and Egypt (various years).

been calculated for Egypt prior to 1945.<sup>22</sup> Egyptian government publications provided two price series, a wholesale price index ( $P_{EG}$ ) 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 UK 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 Dicky-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.<sup>23</sup> 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.<sup>24</sup> 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 UK monetary variables:  $V_{UK}$ ,  $M_{UK}$ , and  $P_{UK}$ . Panels B and C of Table 3 show the cointegration tests between the UK 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 UK velocity and Egyptian monetary variables from Table 3 with those obtained by the Phillips and Hansen (1990) Fully Modified OLS approach.<sup>25</sup> 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

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<sup>22</sup> We have chosen to construct an M3 money aggregate for Egypt in part because it is the only available broad money aggregate for the UK 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 the series for the UK.

<sup>23</sup> This 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.

<sup>24</sup> For all variables except the price level, we are able to reject the hypothesis of non-stationarity of the series in first differences at 5 percent level. The hypothesis that prices in the two countries are stationary in first differences barely passes at the 10 percent, a not uncommon finding for inflation over short-horizons (Robertson and Wickens, 1997).

<sup>25</sup> Given that the ML tests indicates the existence of multiple cointegrating vectors between UK velocity and Egypt’s monetary variables, we choose the vector whose coefficients and sign conforms to theoretical predictions.

variable used. This is largely due to the higher volatility of the wholesale price index for Egypt,  $P_{EG}$ , 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.<sup>26</sup> With these vectors, it is straightforward to generate velocity series for Egypt.<sup>27</sup> We combined the velocity series implied by 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.<sup>28</sup> Appendix Table A1 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 19<sup>th</sup> century, deceleration in the early 20<sup>th</sup> 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 19<sup>th</sup> and early 20<sup>th</sup> century diverges in important ways from the literature.

The most significant differences between the estimates concern the early 20<sup>th</sup> 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 20<sup>th</sup> 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 20<sup>th</sup> 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 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 20<sup>th</sup> century.<sup>29</sup>

The differences between our estimates and previous work become clear when comparing the levels of real per capita GDP. Appendix Table A1 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 20<sup>th</sup> century. Issawi's (1961) estimate for 1913 is extremely close to our estimate for that year. In contrast, Levis's (1922) estimate for 1922, which has been 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 the trend in our series and his is virtually identical. 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.<sup>30</sup>

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 19<sup>th</sup> 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 20<sup>th</sup> by continued inflows of foreign capital until 1907-09 when a combination of a bad

<sup>26</sup> The 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.

<sup>27</sup> Consistent with trends elsewhere, Egypt's estimated velocity displays the initial phase of the commonly found U-shaped, declining from the late 19<sup>th</sup> century until WWII (Bordo and Jonung, 1987). As in the case of Australia, the estimated velocity series for Egypt follows the UK series especially during periods of major monetary disturbances around WWI, the post-WWI deflation, the Great Depression and WWII.

<sup>28</sup> We utilize the coefficients from the cointegrating vector estimated by the Philips and Hansen approach to construct the velocity series used to estimate Egyptian nominal GDP per capita. We deflate this series by the  $CPI_{EG}$  to generate real per capita GDP.

<sup>29</sup> Elsewhere, 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 that aggregate growth performance must have stagnated (Yousef, 2001).

<sup>30</sup> We 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.

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 20<sup>th</sup> century is not reflected in aggregate output growth, notwithstanding the impact of the 1907-09 events.

The slowdown in real output during WWI period is consistent with the record of falling exports, import shortages, and high inflation (Issawi, 1963). The end of the Great War released bent 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 in tandem with what was taking place in Britain at the same time.<sup>31</sup> 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, 1972). 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).<sup>32</sup> The negative effects of WWII are present in real GDP as Egypt was again cut off from world markets and endured a period of shortages and inflation.

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.<sup>33</sup> 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

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<sup>31</sup> The 1920-21 slump is considered Britain's worst recession in the 20<sup>th</sup> century, attributed in part to deflationary monetary policy (Broadberry, 1986, p. 165).

<sup>32</sup> Owen (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. The policy stance of Egypt and its impact is reminiscent of activist Latin American countries analyzed by Diaz-Alejandro (1984).

<sup>33</sup> This 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.

especially visible during the wars and Great Depression where economic activity in other sectors picked up within three years while agriculture experienced slumps lasting 5 years.

Does our money-based methodology account for Egypt's growth performance after 1945? Extending our forecast period to post-WWII period yields point 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 1945-1960.<sup>34</sup> 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 UK 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, 1948).<sup>35</sup> All of these measures implied the end of the tight monetary link between Egypt and the UK. But the 1950s witnessed an even more fundamental changes 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, 1964).

## 5. Conclusion

Using a money-based approach, we exploited Egypt's economic ties with the UK to estimate the first continuous GDP series for the period 1886-1945. Our GDP estimates track well short-term and long-term trends in agricultural output, and they are consistent with other stylized facts in the economic history of Egypt. More importantly, the estimates shed light on important issues concerning Egypt's growth record in the late 19<sup>th</sup> and early 20<sup>th</sup> century. Contrary to the conventional wisdom, relative to the late 19<sup>th</sup> century, income per capita growth decelerated but did not stagnate in the early 20<sup>th</sup> 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 20<sup>th</sup> century is largely supported by our empirical estimates. The biggest recessions took place during the two world wars and the Great Depression.

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<sup>34</sup> There 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).

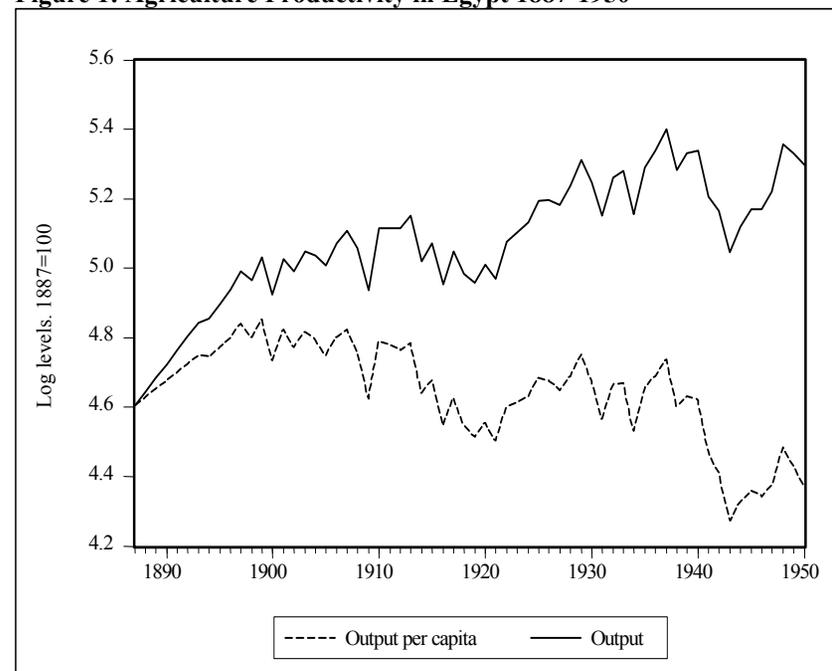
<sup>35</sup> To be precise, these developments were the result of wartime measures to conserve on foreign exchange by making Sterling Area countries surrender their earnings into a common pool managed by London. Unable to convert or use these accumulated balances after 1945, Egypt opted out of the Sterling 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.

## References

- Anis, M.A., 1950. "A Study of the National Income of Egypt," *L'Egypte Contemporaine*, No. 261-62, 849-70.
- Abdel Rahman, S.H., 1959. A Survey of the Foreign Trade of Egypt in the Post-War Period, with Special Reference to Its Impact on the National Economy, Ph.D. Dissertation, Cairo University.
- Bank Misr, 1972. al-Yubil al-Dhahabi, 1920-1970, Cairo.
- Bordo, M. and Jonung, L., 1987. The Long-Run Behavior of the Velocity of Circulation: The International Evidence, Cambridge University Press, Cambridge.
- Bordo, M., 1985. "Effetti e diffusione internazionale delle crisi finanziarie: l'esperienza del periodo 1870-1933," *Rivista di Storia Economica* 3, 295-333.
- Broadberry, S.N., 1986. The British Economy between the Wars: A Macroeconomic Survey, Basil Blackwell, Oxford.
- Capie, F. and Webber, 1985. A., *A Monetary History of the United Kingdom, 1870-1982*, George Allen & Unwin, London.
- Cashin, P., 1995. "Real GDP in the Seven colonies of Australia: 1861-1991," *Review of Income and Wealth*, 41, 19-39.
- Crouchley, A.E., 1936. The Investment of Foreign Capital in Egyptian Companies and Public Debt, Government Press, Cairo.
- Diaz-Alejandro, C.F., 1984. "Latin America in the 1930s," in R. Thorp, ed., *Latin America in the 1930s*, New York: Macmillan.
- Doblin, E.M., 1951. "The Ratio of Income to Money Supply: An International Survey," *Review of Economics and Statistics*, 33, 201-13.
- Egypt (various years), *Annuaire Statistique de l'Egypte*, 1909-60, Cairo.
- Egypt, 1899. *Statistical Returns, 1880-1899*, Government Press, Cairo.
- Feinstein, C.H., 1972. National Income, Expenditure and Output of the United Kingdom, 1855-1965, Cambridge University Press, Cambridge.
- Friedman, M., 1961. "Monetary Data and National Income Estimates," *Economic Development and Cultural Change*, 9, 267-86.
- Greasley, D. and Oxley, L., 2000. "Measuring New Zealand's GDP 1865-1933: A Cointegration-Based Approach," *Review of Income and Wealth*, 46, 351-68.
- Hansen, B., 1991. The Political Economy of Poverty, Equity, and Growth: Egypt and Turkey, Oxford University Press, Washington, D.C.
- Hansen, B., 1979. "Income and Consumption in Egypt, 1886/87-1937," *International Journal of Middle Eastern Studies* 10, 27-47.
- Hansen, B. and Wattleworth, M., 1978. "Agricultural Output and Consumption of Basic Foods in Egypt," *International Journal of Middle Eastern Studies*, 9, 449-69.
- Hansen, B., 1974. "Preliminary Report on an Attempt to Estimate National Product and Income for Egypt, ca. 1880-1913". Institute of International Studies at the University of California, Berkeley.
- Hansen, B. and Marzouk, G., 1965. *Development and Economic Policy in the UAR*, North-Holland, Amsterdam.
- Harris, S.E., 1931. *Monetary Problems of the British Empire*, Macmillan, New York.
- Hawke, G.R., "Income Estimation from Monetary Data: Further Explorations," *Review of Income and Wealth*, 21, 301-7, 1975.
- Issawi, C., 1963. *Egypt in Revolution: An Economic Analysis*, Oxford University Press, London.
- Issawi, C., 1954. *Egypt At Mid-Century: An Economic Survey*, Oxford University Press, London.
- Issawi, C., 1961. "Egypt since 1800: A Study in Lopsided Development," *Journal of Economic History*, 21, 1-25.
- Johansen, S., 1988. "Statistical Analysis of Cointegrating Vectors," *Journal of Economic Dynamics and Control*, 12, 231-54.
- Levi, M.I., "L'Augmentation des Revenus de L'Etat: Possibilites et Moyen d'y Parvenir," *L'Egypte Contemporaine*, No. 68, 696-617, 1922.
- Mabro, R. and Radwan, S., 1976. *The Industrialization of Egypt 1939-1973*, Clarendon Press, Oxford.
- Mead, Donald C., 1967. *Growth and Structural Change in the Egyptian Economy*, Yale University Press, Homewood.
- National Bank of Egypt, 1949. *Fiftieth Anniversary, 1898-1948*, Cairo.
- O'Brien, Patrick, 1968. "The Long Term Growth of Agricultural Development in Egypt: 1821-1962," in P.M. Holt, ed., *Political and Social Change in Modern Egypt*. London: Oxford University Press.
- Osterwald-Lenum, M., 1992. "A Note with Quantiles of the Asymptotic Distribution of the Maximum Likelihood Cointegration Rank Test Statistics," *Oxford Bulletin of Economics and Statistics* 54, 461-72.
- Owen, R. and Pamuk, S., 1998. *A History of Middle East Economies in the Twentieth Century*, Harvard University Press, Cambridge.
- Owen, R., 1993. *The Middle East in the World Economy 1800-1914*, I.B. Tauris, London.
- Owen, R., 1989. "Egypt in the World Depression: Agricultural Recession and Industrial Expansion," in I. White, ed., *The Economies of Africa and Asia in the Great Depression*. London: Routledge.

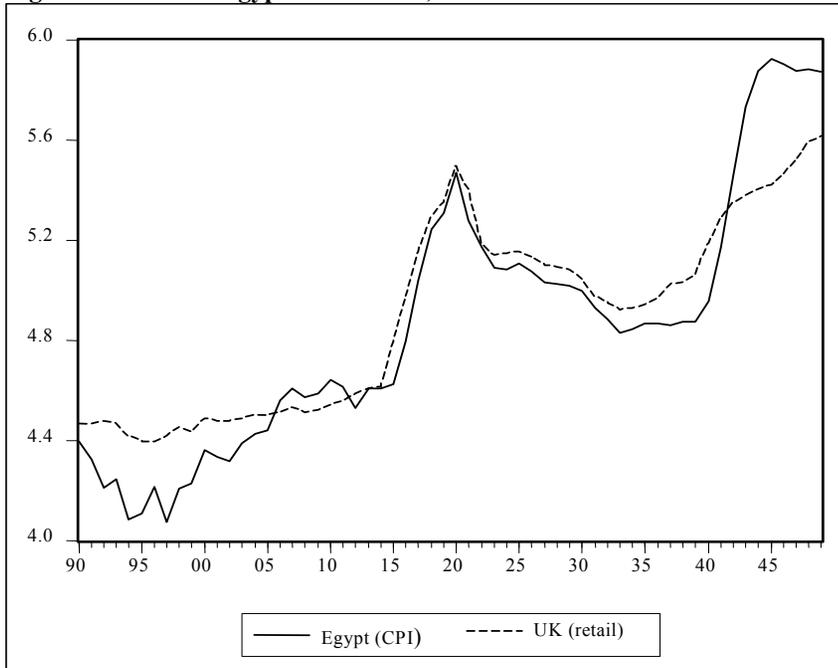
- Owen, R., 1969. *Cotton and the Egyptian Economy, 1820-1914*, Oxford University Press, Oxford.
- Phillips, P.C. and Hansen, B., 1990. "Statistical Inference in Instrumental Variables Regression with I(1) Processes," *Review of Economic Studies*, 57, 99-125.
- Rankin, K., 1992. "New Zealand's Gross National Product: 1859-1929," *Review of Income and Wealth*, 38, 49-69.
- Richards, A., 1982. *Egypt's Agriculture Development, 1800-1980*, Westview Press, Boulder.
- Robertson, D., and Wickens, M.R., 1997., "Measuring Real and Nominal Macroeconomic Shocks and the International Transmission Under Different Monetary Systems," *Oxford Bulletin of Economics and Statistics*, 59, 5-27.
- Rifaat, M. A., 1935. *The Monetary System of Egypt*, George Allen & Unwin, London.
- Sherif, A., 1955. *Economics of Public Utilities*, Alexandria
- Tignor, Robert. L, 1984. *Enterprise and Economic Change in Egypt, 1918-1952*, Princeton University Press, Princeton.
- Vamplew, W. (Ed.), 1987. *Australians Historical Statistics*, Fairfax, Syme & Weldon Associates, New South Wales.
- Williamson, J.G. 2000, "Land, Labor and Globalization in the Pre-Industrial Third World." Harvard Institute of Economic Research Working Paper.
- Yousef, T.M., 2001. "De-Globalization. Divergence and Inter-War Egypt," mimeo, Department of Economics, Georgetown University.
- Yousef, T.M., 2000. "The Political Economy of Interwar Egyptian Cotton Policy," *Explorations in Economic History* 37, 301-25.

**Figure 1: Agriculture Productivity in Egypt 1887-1950**



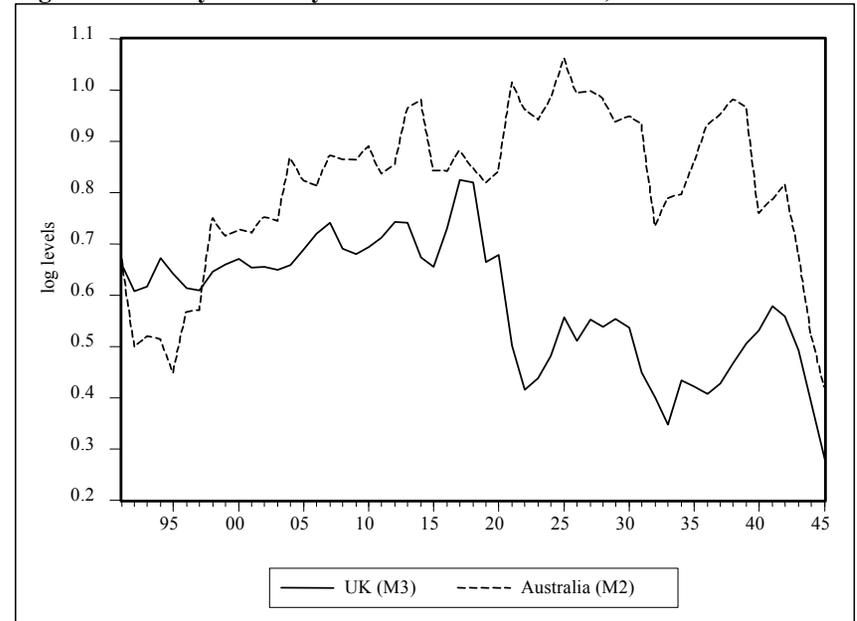
Sources: Agricultural output is taken from Hansen and Wattleworth (1978, Table 3). Output per rural capital is based on rural population estimates, which are taken from Egypt (various years) and Meade (1967, Table II-A-3) for 1913-1950, and Hansen (1974, Table 1) for 1885-1913.

**Figure 2: Prices in Egypt and the UK, 1890-1950**



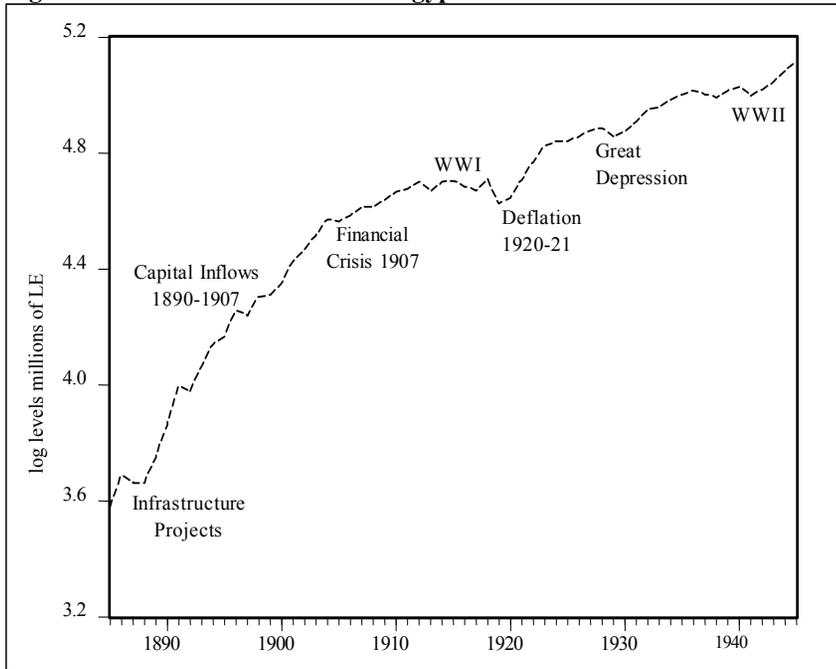
Sources: See sources in Table 2

**Figure 3: Velocity of Money in Australia and the UK, 1890-1950**



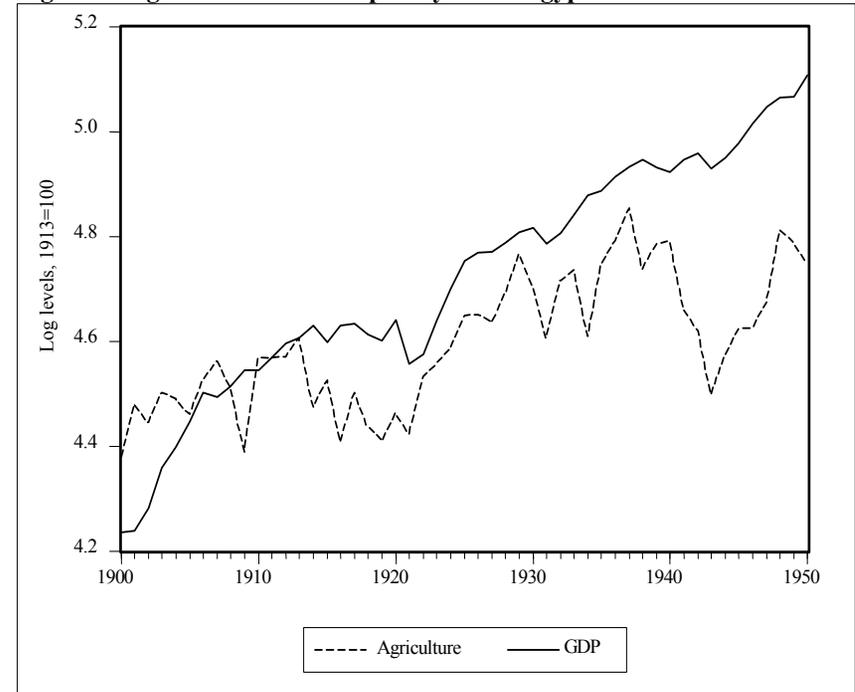
Sources: See Table 2 for sources of UK M3 velocity. Australia's velocity is based on the GDP (Table ANA 50-64) and M2 (Table PF 57-63) series in Vamplew (1987).

**Figure 4: Real GDP Estimates for Egypt 1885-1945**



Sources: Our series is based on the empirical results in column 3 of Table 4 and reported in column 2 of Table 6.

**Figure 5: Agricultural and Output Cycles in Egypt 1900-1950**



Sources: Real GDP is based on the on the empirical results and reported in Appendix Table 6. See Figure 1 for agricultural output.

**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	-1.20	-	-
Pre WWI (1886-1912)	1.01	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
20 <sup>th</sup> 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.

**Table 2: Unit Root Tests for Egyptian and UK Monetary Variables, 1886-1950**

Variables	ADF (L)	PP(L)
<b>A. Variables in Levels</b>		
VUK	-2.22 (2)	-2.77 (3)
PUK	-2.41 (2)	-1.93 (3)
M3UK	-2.11 (2)	-1.93 (3)
WPEG	-1.78 (2)	-1.94 (3)
CPIEG	-2.17 (3)	-1.69 (3)
M3EG	-2.46 (2)	-2.00 (3)
<b>B. Variables in First Differences</b>		
VUK	-5.19 (2) **	-5.49 (3)**
PUK	-3.22 (2) *	-3.96 (3)**
MUK	-3.24 (2) *	-3.28 (2) *
WPEG	-3.74 (2) **	-7.47 (3)**
CPIEG	-3.22 (3) *	-6.19 (3)**
M3EG	-4.28 (2) **	-5.50 (3)**

Notes: The UK variables are velocity, M3 and retail prices; the Egyptian variables consist of M3 per capita, wholesale prices and consumer prices. ADF is the Augmented Dickey-Fuller Statistic test, PP is the Phillips-Perron test. L denotes the proper lag order based on the AIC criterion. \*\* and \* imply rejection of the null hypothesis of non-stationary 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 21.

UK: 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 M3 series and the nominal GNP series of Feinstein (1971, Table 1); and retail prices are taken from Feinstein (1971, Table 65).

**Table 3: Maximum Likelihood Cointegration Tests, 1886-1950**

Null Hypothesis	Trace		Maximal Eigenvalue	
	Alternative Hypothesis	Test Statistic	Alternative Hypothesis	Test Statistic
<b>A. Cointegrating System: UK Velocity, M3 and Prices</b>				
$r = 0$	$r = 1$	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
<b>B. Cointegrating System: UK Velocity, Egyptian M3 and CPI</b>				
$r = 0$	$r = 1$	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
<b>C. Cointegrating System: UK Velocity, Egyptian M3 and WPI</b>				
$r = 0$	$r = 1$	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 UK Velocity and Egyptian Money and Price Variables, 1886-1950**

Variable	Cointegration Approach		Variable	Cointegration Approach	
	ML	PH		ML	PH
VUK	(1)	(2)	VUK	(3)	(4)
M3EG	-0.48	-0.48	M3EG	-0.76	-0.54
CPIEG	0.24	0.32	WPEG	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.

**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 1 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 6.

**Appendix****Table A1: Nominal and Real GDP Estimates for Egypt, 1886-1945**

	New Estimates				Previous Studies
	Nom. GDP (millions L.E. )	Real GDP (millions L.E. )	Nom. GDP per capita (L.E.)	Real 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	

**Table A1: Cont'd.**

	New Estimates				Previous Studies
	Nom. GDP (millions L.E.)	Real GDP (millions L.E.)	Nom. GDP per capita (L.E.)	Real GDP per capita (L.E.)	Real GDP per capita (L.E.)
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
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 data are given in 1913 prices. L.E. is the Egyptian pound, roughly equivalent to 1 £.UK.

*Source:* The estimates of this paper are calculated using the cointegration vector in column 1 of Table 4, deflated when relevant by population and consumer prices. Previous estimates have been deflated by the same population and price 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.