Declining Productivity Revisited: Secular Trends or Cyclical Losses?

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Abstract:
Dickens (1982) argued that the productivity slowdown since the mid 1960s is cyclical and not a long-term trend. This letter tests the robustness of Dickens' conclusion, specifically with respect to labor productivity.

Article:
1. Introduction
The slowdown in labor productivity since the mid-1960s is well documented; however, we are far from agreeing on why the slowdown(s) occurred. Many different hypotheses have been proffered: [1] most recently in this *Journal* Dickens (1982, p. 37) argued that the culprit (responsible for the slowdown) is likely to be associated with business cycles rather than some long-term (secular) change'. The purpose of this note is to test the robustness of Dickens' contention, specifically to test if labor productivity is permanently lost during a cyclical downturn.

2. The empirical analysis
To test empirically for the cyclical and secular components in the labor productivity slowdown Dickens estimated the following equation [adopted from Gordon (1979)]:

$$\dot{\pi} = \alpha + \beta_1 EED + \beta_2 DOWN + \beta_3 D66 + \beta_4 D73 + \beta_5 D77 + \epsilon\ , \qquad (1)$$

where $\dot{\pi}$ is the percentage change in labor productivity over the period 1954.II to 1980.IV, [2] *EED* is an end-of-expansion dummy variable, [3] *DOWN* is a dummy variable denoting cyclical downturn periods, [4] *D66, D73* and *D77* are secular trend dummy variables, [5] and ϵ is a random error term.

Following Dickens, $\hat{\beta}_1 > 0$ would confirm Gordon's end-of-expansion hypothesis; $\hat{\beta}_2 < 0$ would imply a permanent loss in labor productivity during a cycle, and $\hat{\beta}_3$, $\hat{\beta}_4$, and $\hat{\beta}_5 < 0$ would suggest that there are secular trends to labor productivity growth.

Dickens' estimates of eq. (1) are reported in column (1) of table 1.[6] Since the estimated coefficient on *EED* ($\hat{\beta}_1$) is insignificant and since *D77* ($\hat{\beta}_5$) is the only significant secular coefficient, he interprets the significant negative coefficient on *DOWN* ($\hat{\beta}_2$) to suggest that there is a permanent loss in labor productivity that is not regained during the following period of recovery.

Although Dickens' conclusion is appealing, it may be the result of estimating a misspecified equation. The competing hypotheses are that there has been a secular versus a cyclical loss in productivity. Thus, it is crucial to account correctly for the cyclical component in labor productivity growth in the specification of the model. This is, in our opinion, not done in Dickens' eq. (1).

Following Gordon, we include in that equation the percentage change of the current and lagged value of the ratio of real to potential GNP, *(Q/Q*)*, as a cyclical variable.[7] The corresponding results are reported in column (2) of table 1. The estimated coefficients on these cyclical variables are highly significant and their inclusion causes the *DOWN* coefficient to become insignificant.[8]

Table 1
Estimated regression results (*t*-statistics in parentheses).

Independent variables	Dependent variables			
	$\dot{\pi}$ (1)	$\dot{\pi}$ (2)	$\dot{\pi}_B$ (3)	$\dot{\pi}_M$ (4)
Normal annual growth rate [a]	3.23 (6.15) [b]	2.51 (6.25) [b]	3.48 (7.55) [b]	2.91 (3.29) [b]
EED	0.23 (0.19)	1.14 (1.21)	1.01 (0.93)	1.24 (0.59)
DOWN	−3.71 (−2.61) [b]	−1.22 (−1.04)	−0.69 (−0.48)	−1.05 (−0.38)
D66	−0.32 (−0.44)	−0.39 (−0.76)	−0.84 (−1.48)	0.37 (0.34)
D73	−0.93 (−1.05)	−0.90 (−1.45)	−1.57 (−2.31) [c]	−0.04 (−0.04)
D77	−1.83 (−2.12) [c]	−1.92 (−3.17) [b]		
$(Q/Q^*)_t$		0.57 (8.65) [b]	0.60 (7.46) [b]	0.99 (6.37) [b]
$(Q/Q^*)_{t-1}$		−0.43 (−7.60) [b]	−0.43 (−6.20) [b]	−0.31 (−2.33) [b]
R^2	0.325	0.674	0.595	0.463
F-level	9.75	29.20	20.59	12.09
D.W.	2.30	1.88	2.31	1.80
n	107	107	91	91

[a] The normal annual growth rate is the intercept term multiplied by 4.
[b] Significant at 0.01 level.
[c] Significant at 0.05 level.

We interpret these results to mean that the slowdown in the growth of labor productivity between 1954 and 1980 is primarily a cyclical phenomenon, and that any productivity losses incurred during a recession are recovered during the following upturn.[9] An alternative explanation for the insignificant coefficient on *DOWN* is that *(Q/Q*)* captures both a permanent and cyclical loss of productivity during recessions.[10] However, this is unlikely since Gordon's Q^* is derived from estimating a production function rather than a time trend. The simple correlation coefficient between the percentage change in *(Q/Q*)* and *DOWN* is —0.43.[11]

Furthermore, the results reported in column (2) are robust. Using alternative measures of labor productivity for both the private business economy, $\dot{\pi}_B$, and for the manufacturing sector, $\dot{\pi}_M$, we obtain similar results to those in column (2). 12 As seen from columns (3) and (4) the evidence supporting a permanent loss in productivity is, at best, weak.

3. Conclusions

The findings presented herein emphasize that more empirical work is warranted in an attempt to isolate the causes and correlates associated with the recent decline in labor productivity growth. Our results cast some doubt on Dickens' conclusion that 'once the permanent loss of productivity growth during slowdowns is taken into account there may be nothing left to the secular productivity crisis' (p. 42). We would modify this conclusion, on the basis of our findings, by suggesting that the cyclical component of the productivity slowdown dominates whatever secular trend may exist, and that there is some doubt regarding the existence of a permanent loss occurring during slowdown periods, *ceteris paribus.*

Notes:

[1] For a review of the literature on the causes and correlates of the productivity slowdown, see Link (1983).

[2] $\dot{\pi}$ is calculated by Dickens from quarterly data as the percentage change in gross domestic non-farm business product less housing services (BEA seasonally adjusted) divided by an index of hours of all persons in the non-farm business sector (BLS seasonally adjusted).

[3] *EED* is a modified version of Gordon's end-of-expansion dummy variable. Gordon's variable is modeled to capture the overhiring that occurs in the later stages of a business expansion (labor productivity falls). For each cycle *EED* takes on a value of 0.1667 during the first six quarters and a value of —0.125 during the next eight quarters. An exception is that the values are 0.25 for the first four quarters and — 0.1667 for the next six quarters for the period beginning 1955.1V and for 1966 mini-recession which begins in 1966.11.

[4] *DOWN* takes on a value of 0.25 during the first six quarters of each downturn and for the first four quarters of the 1956 and 1966 downturns.

[5] *D66, D73, D77* are dummy variables set equal to 0.25 in the first quarter of the years 1966, 1973 and 1977, and 0 otherwise.

[6] The data used to estimate this equation were graciously provided to us by Dickens. The provided dependent variable is measured from *revised* Data Resources Inc. estimates on labor productivity. This accounts for the mild discrepancy between the coefficients reported here and those originally reported by Dickens. The *(Q/Q*)* variable is real GNP and natural GNP *(Q*)* in 1972 dollars. These were obtained from the revised series originally published in Gordon (1981), table B-1. Our data are available upon request.

[7] Up to a six quarter lag for *(Q/Q*)* was tested though only the coefficients on the contemporary and one quarter lagged terms were significant.

[8] *EED* and *DOWN* are highly collinear (—0.9). If either *EED* or *DOWN* is omitted from the equations the coefficient for the other variables becomes significant.

[9] This interpretation is consistent with not only Gordon, but also with Nordhaus (1972), Perry (1971,1977), Mohr (1980) and Neftci (1981), among others.

[10] We are indebted to Dickens for this point.

[11] Similar 'empirical results are obtained when Tatom's (1982) *Q** series is substituted for Gordon's.

[12] Quarterly data from 1954.11 to 1976.IV on labor productivity for these two sectors came from Kendrick and Grossman (1980).

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