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# China-Africa Trade: The Uneven Development Hypothesis and Labor Considerations

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**Abstract:** Neo-Marxist viewpoint on international trade suggests that development of some nations presupposes, or even causes, the underdevelopment of dependent countries, which are subjected to imperialist exploitation. On this ground, this paper examined the claims that Africa's trade with China has resulted in (i) economic growth rates led by imports from and exports to China, and (ii) deterioration in local African employment. Using the Toda-Yamamoto version of Granger no-causality test and Johansen's cointegration test, the results indicate that even though there is a clear causal link between economic growth rates in Africa and imports from (rather than exports to) China, trade variables exert negative effects on employment. The paper's findings seem to partially refute the uneven development hypothesis in the China-Africa relations while calling for an even development pattern that would be socially less disruptive (in terms of labor and class relations) and economically more sustainable.

## 1. Introduction

In *Das Capital*, Karl Marx argued that accumulation of wealth at one pole is inherently a simultaneous accumulation of misery at the opposite pole. Such theoretical reasoning supports the idea that capitalist accumulation disadvantages labor relative to capital. This uneven development viewpoint has since been extended into the arena of international trade to suggest that development of some nations presupposes, or even causes, the underdevelopment of dependent countries, which are subjected to imperialist exploitation (Milios, 2007). The policy response to this exploitation has been to delink underdeveloped economies from global capitalism (as recommended by Gunder Frank and other dependentista theorists). However, the success of East Asian capitalism in overcoming underdevelopment through closer integration with global capitalism has challenged the validity of this neo-Marxist viewpoint (Singh, 2007).

Nevertheless, because of increasing disparities between and inside countries and the dramatic increase in cross-border trade, this uneven development viewpoint has reemerged in recent years. Most especially, in a global economic environment dominated by fragmented production, a debate has emerged about the (un)even nature of newly emerging trade patterns like that between China and Africa. More specifically, China's venture into

Africa has prompted accusations of uneven development. Whereas most observers and the media seemingly agree about the potentials for such an outcome, the available literature (Broadman, 2006; Maswana, 2007; Zafar, 2007) offers little comfort for the uneven development hypothesis. Moreover, previous studies on China-Africa trade have neglected the important role of labor, both as social practice and as embodied productive potential. Since in materialist theory, accumulation is explained as the result of particular social relations (Weeks, 1981), this neglect is problematic because questions of international trade cannot be adequately conceptualized without considering both the material and social dimensions of labor. This need to seriously consider the role of labor, as well as the lack of consensus on the even development of China-Africa trade, provides the underlying motivation for this present study.

Using the Toda-Yamamoto version of Granger no-causality (based on the SUR system and Wald tests) and Johansen's cointegration tests, this paper examines the claims that Africa's trade with China (represented by that of South Africa and Kenya) has resulted in (i) economic growth rates led by imports from and exports to China, which would support the hypothesis of a fair trade distribution, and (ii) deterioration in local African employment, which would imply that the share of economic rewards going to labor implies capitalistic exploitation.

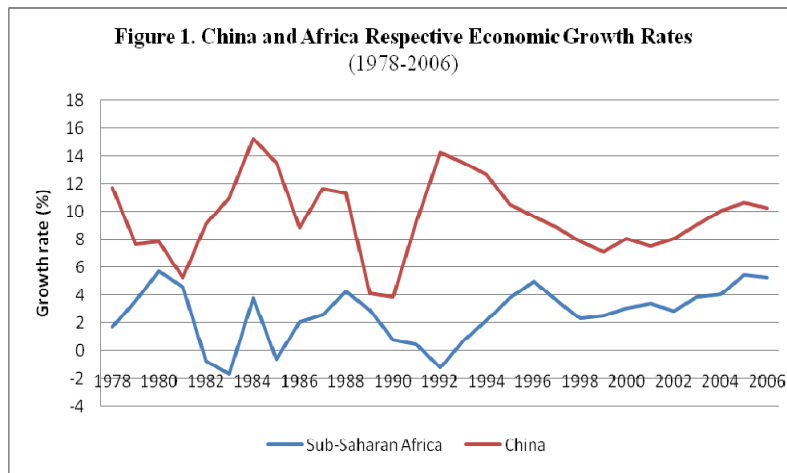
The rest of the paper proceeds as follows. Section II provides some stylized facts on the Africa-China economic linkages, after which Section III explores the methodological considerations. Section IV presents the empirical results. Section VI concludes with recommendations for moving China-Africa cooperation forward.

## **2. Stylized Facts on China-Africa Trade and Economic Linkages**

To explore the validity of the Marxist uneven development hypothesis in the context of emerging China-Africa trade and economic relations, it is necessary to identify the potential sources of uneven development and demonstrate its inherent contradictions.

First, over the past 15 years, trade between China and Africa has undergone a tremendous change, with Africa's economic growth rates becoming synchronized with China's since the mid-1990s (see Figure 1).

### **Figure 1**



Source: IMF-IFS, 2007

Thus, in 2005, China's exports to Africa amounted to \$19 billion, compared to negligible levels in 1990 and about \$5 billion in 2000. Likewise, China's imports from Africa have also surged, from US\$5 billion in 2000 to over US\$20 billion in 2005. Indeed, since 2000, they have grown annually by 30%, and have accounted for about 20% of Africa's total export growth.

During this growth, trading spillovers have been channeled through sub-regional economic drivers like South Africa and Kenya because of their integration with their respective neighbors. Indeed, South Africa is China's largest trading partner in Africa, with a 20% share in the China-Africa trade. During 2005, South Africa's exports to China totaled around US\$3,444 million, and South African imports from China have also increased dramatically over the last 10 years, reaching \$4,926 million or 9.0% of the total by December 2005, up from a 2.1% market share in 1996. These 2005 imports are 37% over the 2004 figure, much higher than the increase of overall global exports into South Africa of 15.5% (Sandrey, 2006).

Like South Africa, Kenya is a major trading partner for China in East Africa, with the primary Kenyan imports from China including household electric appliances, industrial/agricultural tools, construction materials, and medicine. China in turn imports black tea, coffee, and leatherwares from Kenya. In 2000, the volume of bilateral trade between China and Kenya was US\$136.933 million, with US\$133.083 million in export from China and US\$3.85 million in import by China.

At the same time, even though historically, commodity booms have proven harmful to long-term African development because of the so-called Dutch disease of overvalued currencies, China's tremendous economic growth has been accompanied by an unprecedented improvement in Africa's net barter terms of trade. Yet chronically overvalued currencies have still negatively affected export growth and Africa's global competitiveness by preventing the continent from diversifying the economic structure it inherited from colonialism.

Nevertheless, the dramatic expansion of China-Africa trade and investment over the last decades has probably promoted economic growth in Africa, although the implication for African local labor has become the subject of intense debate. One such debate is about the practices of some Chinese-funded projects in which the percentage ratio of Chinese expatriates contracted (labor and enterprises) to locals is believed to be as high as 70% to 30%. This practice, coupled with low production of intermediate goods in Africa, has generated fears of deindustrialization (Rocha, 2007) and exploitation of local workers. For instance, the failure to substitute African workers for Chinese workers employed in the recent flurry of Chinese infrastructure projects—whether technicians or un/semiskilled laborers—is an important oversight with both economic and political implications (Davies & Alden, 2006).

In addition, the possibility that textile imports from China are undermining African job markets cannot be ruled out. Given that Chinese firms often import their own labor, such job creation, despite its roots in legitimate market competition, may result in further deterioration of already poor labor standards and unequal development.

In light of the above, there seems ample support for taking labor force considerations into account when investigating international trade linkages between China and Africa.

### 3. Methodological Considerations

#### 3.1. Estimation framework

The growth model used here is based on the neoclassical growth model and relates increases in output to increases in input of capital and labor. Following Amavilah (2003), the model is a trade-augmented production function ( $f$ ) of capital ( $K$ ) and labor ( $L$ ) given as follows:

$$Y = f(K, L, T) \quad (1)$$

The role of trade ( $T$ ) is defended on the grounds that it is either a placeholder for land, as in the classical version of production, or it is openness and  $T$ -allied technical change, as in the endogenous growth models that measure  $T$  by either exports ( $X$ ) or imports ( $M$ ). In per capita terms and assuming that capital per worker is constant in the short run, Eq. (1) in logarithmic form gives

$$\ln y = \alpha + \beta \ln T + \mu \quad (2)$$

where  $y$  represents the log form of per capita growth rate and  $\mu$  the disturbance term.

In the empirical literature, the joint determination of both trade and economic growth variables makes the empirical relationship subject to the problem of reverse causality and endogeneity. However, endogeneity problems may be overcome by adopting a system of equations such as a vector autoregressive (VAR) system. Equation (2) is thus estimated following a four-step procedure that begins with unit-root testing to determine the

time-series properties of the data and continues with lag-length specification. Specifically, the test proceeds in four steps: identification of the unit's integration properties (Granger, 1986; Engle and Granger, 1987; Dickey and Fuller, 1981), optimal lag length selection, Toda-Yamamoto causality tests, and finally, cointegration tests (for further discussion, see Johansen, 1988; Johansen and Juselius, 1990).

### 3.2. Causality testing procedure

According to Granger (1969), if the inclusion of past (lagged) values of  $X$  contributes significantly to the explanation of  $Y$  in a  $Y$  regression with respect to its own past values and all other relevant information, then  $X$  is said to Granger-cause  $Y$ . To examine the nature of causality between  $X$  and  $Y$ , an appropriate Granger causality test requires determination of an equal lag length VAR involving  $X$  and  $Y$ . The importance of determining the lag length is demonstrated by Lutkepohl (1993), who shows that overfitting (i.e., selecting a lag length of higher order than the true lag length) causes an increase in the VAR mean-square forecast errors, whereas underfitting the lag length often generates autocorrelated errors. To avoid over- or underfitting the lag length, Toda and Yamamoto (1995) provide an alternative approach based on the Granger test equations but augmented with extra lags whose number depends on the potential order of integration of the series of interest.

The Toda–Yamamoto (1995) approach involves using levels of variables as in (3) and (4) and estimating the following bivariate VAR system through the seemingly unrelated regression (SUR) model:

$$X_t = \alpha + \sum_{i=1}^{p+d} \beta_i X_{t-i} + \sum_{j=1}^{p+d} \gamma_j Y_{t-j} + v_t \quad (3)$$

$$Y_t = a + \sum_{i=1}^{p+d} b_i Y_{t-i} + \sum_{j=1}^{p+d} c_j X_{t-j} + u_t, \quad (4)$$

where  $\alpha$  and  $a$  are constant terms,  $\beta$  and  $\gamma$  are coefficients of exogenous variables,  $k$  is the optimal lag length in the original VAR1 system,  $d$  is the maximal order of integration of the variables in the VAR system, and  $u_t$  and  $v_t$  are white-noise error terms.

The testing procedure consists of estimating an augmented VAR( $k + dmax$ ) model, in which the initial lag lengths,  $k$ , are augmented with an extra lag that is dependent on the likely integration order of the series  $X_t$  and  $Y_t$ . If  $X_t$  and  $Y_t$  are both integrated of, for instance, order 1, then one extra lag is added to each of the original VAR models. Using an SUR form as suggested in Rambaldi and Doran (1996), the modified Wald (MWald) test for zero restrictions can then be used to determine the direction of causality. For example, in (3), the lags for  $Y_t$  (excluding the extra lag added to capture the maximum order of integration) are tested for their joint significance (i.e., the  $\gamma_j$ 's in (3) are hypothesized to equal zero). If the null hypothesis (that the lags are jointly equal to zero) is accepted, then  $Y_t$  does not Granger-cause  $X_t$  in (3). Similarly, the null hypothesis that the joint significance of the  $c_i$ s in (4) equals zero provides an indication of reverse causality.

### 3.3. Datasets

The dataset used for the causality analysis comprises quarterly time series of Kenya and South-Africa's per capita GDP growth rates, exports to, and imports from China. Following the relevant literature, economic growth is defined as the percentage change of per capita GDP. Time series data for each of the three primary variables are collected from the IMF's Direction of Trade Statistics (various editions), while the per capita GDP growth rate (1990–2006) is taken from the GDI (World Bank, 2006). Quarterly labor statistics being unavailable, the cointegration tests are done using annual time series of growth rates,

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1 The original VAR is in the following form: 
$$X_t = \alpha + \sum_{i=1}^p \beta_i X_{t-i} + \sum_{j=1}^p \gamma_j Y_{t-j} + v_t$$

imports from China, and labor (measured as the ratio of labor force to total population), all taken from WDI 2007 (World Bank, 2007).

## 4. Estimation Results

### 4.1. Results of integration properties

The tests performed include either a simple intercept or a linear time trend. The maximal integration orders ( $d_{\max}$ ) for the variables are given in Table 1, which shows that all variables are integrated of order 1.

**Table 1. Unit Root Test Results**

	Without linear time trend		With linear time trend	
	Level	1st Difference	Level	1st Difference
$Y_{SA}$	-0.98	-5.38*	-1.86	-5.39*
$Y_{SA}$	-1.45	-6.39*	-3.50	-6.48*
$Y_{SA}$	-0.19	-7.61*	-2.10	-7.50*
$Y_{SA}$	-0.26	-5.29**	-1.43	-5.18*
$Y_{KE}$	-1.33	-4.17*	-1.76	-4.06**
$Y_{KE}$	-0.82	-6.56*	-1.84	-6.28**
$Y_{KE}$	-1.99	-4.91**	-1.84	-6.28*
$Y_{KE}$	1.54	-1.42*	-4.64	-7.98**

Note: \* and \*\* indicate significance at the 5% and 10% levels, respectively.

$Y_{SA}$  and  $Y_{KE}$  stand for growth in South Africa and Kenya, respectively.

Once it is determined that  $d_{\max} = 1$  for all series, it is possible to calculate the lag structure of a system of VAR in levels. The results, given in Table 2, indicate that the optimal lag length based on Akaike's FPE criteria is  $k = 1$  for models 1 and 2, and  $k = 2$  for

models 3 and 4. A VAR system is then estimated with a total of  $d_{max} + k = 2$  lags for models 1 and 2, and  $d_{max} + k = 3$  lags for models 3 and 4.

**Table 2. Optimal Lag Selection**

AR	Variable	Optimal	
		Lag	$d_{max} + k$
1	$X_{SA}$ and $Y_{SA}$	1	2
2	$M_{SA}$ and $Y_{SA}$	1	2
3	$X_{KE}$ and $Y_{KE}$	2	3
4	$M_{KE}$ and $Y_{KE}$	2	3

**4.2. Toda-Yamamoto causality tests**

The long-run causality Wald test statistics and  $p$ -values based on Toda and Yamamoto’s (1995) level VAR procedure are given in Table 3. The levels are estimated in such a way that a significant Wald test statistic indicates a long-term relationship. The small  $p$ -values for the models listed (models 1a, 2a, 3a, and 3b) call for rejection of the joint null hypothesis at standard significance levels. In the South African case, the results point to unidirectional causality running from  $Y_{SA} \rightarrow X_{SA}$  but support bidirectional causality between  $Y_{SA} \leftrightarrow M_{SA}$ . The Kenya case, in contrast, reveals two unidirectional causalities,  $Y_{KE} \rightarrow X_{KE}$  and  $M_{KE} \rightarrow Y_{KE}$ .

**Table 3. Toda–Yamamoto’s Version of the Granger Causality Results**

M	Null Hypothesis	MWald	
odel		Statistics	LM
1a	$Y_{SA}$ does not Granger-cause $X_{SA}$	15.186 (0.002)	4.221 (0.000)
1b	$X_{SA}$ does not Granger-cause $Y_{SA}$	2.197 (0.333)	0.420 (0.299)
2a	$Y_{SA}$ does not Granger-cause $M_{SA}$	12.7287 (0.004)	3.157 (0.013)
2b	$M_{SA}$ does not Granger-cause $Y_{SA}$	21.091 (0.000)	4.006 (0.040)
3a	$Y_{KE}$ does not Granger-cause $X_{KE}$	7.268 (0.002)	3.243 (0.046)
3b	$X_{KE}$ does not Granger-cause $Y_{KE}$	3.188 (0.301)	1.336 (0.096)
4a	$Y_{KE}$ does not Granger-cause $M_{KE}$	4.628 (0.276)	0.723 (0.177)

<b>4b</b>	$M_{KE}$ does not Granger-cause $Y_{KE}$	11.238 (0.004)	3.911 (0.418)
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Note: The figures in parentheses are the  $p$ -values.

The LM results are verified using a Breusch-Pagan Lagrange Multiplier (LM) test, which confirms the suitability of the SUR estimation versus the standard VAR estimation and leads to rejection of the null hypotheses in models 1a, 2a, 3a, and 4b (see Table 3).

Because the causality test results support the imports-growth link, the labor variable is added to the above two variables in the cointegration tests of labor and imports (with growth rate as the endogenous/control variable).

### 4.3 Results of the cointegration tests (labor–imports)

For the Johansen cointegration test procedure, the choice of optimal lags is based on minimization of the AIC and the absence of autocorrelation in the VAR residuals; it includes two lags for the levels of variables. The results of the  $\lambda_{trace}$  tests are reported in Table 4, in which the empirical findings for Kenya indicate the presence of one cointegrating vector in the labor–import pair at the 0.05 level. Additionally, the corresponding error-correction term has the expected sign and is statistically significant ( $ecm_{t-1} = -0.09$  with a  $t$ -statistic of 2.59). Moreover, there is no evidence of serial correlation and heteroscedasticity in the residual series (For brevity the results are not reported here).

**Table 4. Import–Growth–Labor Cointegration (Kenya)**

Hypothesized No. of cointegrating vectors	Eigenvalue	$\lambda_{trace}$ test Statistic	0.05 Critical	Prob>**
None*	0.736	37.115	29.79	0.0
At most 1	0.292	7.7608	15.49	0.4
At most 2	0.006	0.1500	3.841	0.6

\*Denotes rejection of the hypothesis at the 0.05 level.

\*\*MacKinnon-Haug-Michelis (1999)  $p$ -values.

Trend assumption: no deterministic trend (restricted constant)

The results suggest that a shift in the level of imports of intermediate goods from China leads, in the long run, to a significant change in the level of employment.

## 5. Discussion

Interestingly, the empirical findings primarily support the imports-from-China-led growth hypothesis for both the South African and Kenyan cases but provide a feedback effect only for the former. The most striking finding is the lack of support for the export-led hypothesis in either case, although the reverse causality hypothesis (that economic growth leads exports) is confirmed. This lack of evidence for the export-led growth hypothesis calls into question the capitalist international division of labor in which African economic growth is expected to result from its role as exporter of primary commodities.

Moreover, causality between import and economic growth suggests that intermediate inputs might have enhanced productivity in Africa by providing domestic firms with access to technologies embodied in capital goods and intermediate inputs from China that are not available domestically (see Bayoumi et al., 1996). In turn, increases in intermediate imports, associated with technological upgrading and increased competition might have contributed to employment reduction, especially among unskilled workers (since technological improvement makes them redundant, but their lack of skills makes any job reconversion unlikely).

Facing fierce competition, Chinese firms operating in Africa respond by rationally, and often capitalistically, searching for the cheapest wage labor to produce a particular quantity and ensure the most profits. Thus, it seems plausible that the shares of income that owners of capital operating in Africa and local workers each receive might have been altered in favor of the former. That is, unintentionally, Chinese firms need only play by the rule of current capitalism: exploitation of the workers. Thus, even when capitalist exploitation does not intentionally harm workers, it harms them to meet its production and profit needs. As a result, economic growth in Africa should not be understood as worker welfare but rather as the expanded reproduction of an exploitative relation of class power.

Taken together, these results do not necessarily support the uneven development hypothesis; however, most especially given the import-growth bidirectional causality in the South African case, they do imply that the African trade structure with China may be shifting from typical accumulative economic growth to technology-embodied items. Hence, the feedback loop (bidirectional causality) between import from China and growth in South Africa evokes a perfect emergent system in which trade interdependence rather than dependence can be expected. Accordingly, restructuring the China-Africa trade relations with the local labor market should be a straightforward task, at least in principle, that is essential to guaranteeing that increasing trade improves welfare and development is evenly distributed.

## **6. Concluding remarks**

This paper has investigated how best to cope with the possible contradictions of a rapidly growing China's triggering of economic growth in Africa from the viewpoint of the Marxist theory of uneven development. Most specifically, it has shown that the processes in question should be understood not only as the outcome of class struggle but also as a result of accelerated capitalist accumulation in the form of economic growth in Africa.

Most particularly, the results of the Toda-Yamamoto version of Granger no-causality (based on the SUR system and Wald tests) and Johansen's cointegration tests suggest that, within African economic growth from trading with China, the capital accumulation processes in Kenya and South Africa are not moving apart as the uneven development hypothesis would suggest. On the contrary, the findings point to employment as the possible loser in this partnership. Thus, the findings for the China-Africa trade links seem to partially refute the uneven development hypothesis.

Clearly, an even development pattern would be socially less disruptive and economically more sustainable. However, restructuring China-Africa relations away from capitalistic exploitation would have to move beyond mere economic considerations to encompass issues of labor and class relations. Thus, providing a critical understanding of the sources of uneven and combined development is an important step toward making the right social choices. Nevertheless, more evidence on this topic is clearly needed and hence represents an important and emergent line of inquiry for better understanding globalization and its consequences for labor outcomes. Most particularly, even though Marx envisioned an uneven development, today's global economy makes possible one that is combined and sustainable.

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