

FDI and Total Factor Productivity Nexus in Nepal

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Abstract

This study empirically investigates the impact of FDI on the TFP growth of firms in Nepal from 1990 to 2018, employing an econometric model based on the Cobb-Dougllass production function and a theoretical Solow model of the TFP growth accounting method. The study used a time series database (1990–2018). As a result, the econometric and non-parametric TFP estimations provide mostly positive TFP growth of FDI firms in Nepal, except for a few cases influenced by political and security disturbances. Positive TFP growth in almost years indicates increased productivity of FDI firms at a lower than expected level, despite the fact that FDI firms are still constrained by problems such as massive inferior labor, no significant technological and financial transfer, and a poor business environment. Issues of continuity and stability between the two periods indicate the unpredictable situation of productivity. Therefore, FDI policy framework should focus on output and outcomes to invite FDI rather than FDI size, nature, and source.

Keywords: FDI, TFP Growth, Economic Reform, Liberalization, Firm, Nepal

1. Introduction

A lower factor productivity of firm is a major issue in developing and least developed countries like Nepal, as it is difficult to shift the outward production possibility curve with efficiency and optimal resource allocation. In the 1990s, this issue was a key constraint to the output performance of firm and industrial growth led economic growth. When it was analyzed, the allocated factors of production including capital investment, technological transfer, managerial skill, and access to the international market were not efficient and productive as planned because the economy was partially liberalized in 1980s (MoF, 1985) but all resources were not competitive, open and optimally allocated (MoF, 1992). As a result, macro-economic indicators were instable. Economic growth rate was 4.3 percent (MoF, 1992). GDP size was NRs. 103.75 Billion, out of which Trade-GDP ratio was 32 percent. Per capita income was only 250 USD. Balance of Payment (BOP) was negative with NRs. 304.4 million. Inflation was 8.9 percent (MoF, 1992). Poverty level was 42 percent and 33 percent inequality (NPC, 1992; Bista, 2016, 2021). In that context, the world bank and IMF prescribed economic reform to Nepal for getting macro-economic stability and higher growth and continuing development assistance. Nepal considered it because of three obligatory situations: a) wider resource gap, b) highly dependent on foreign aid and debt, and c) growing aspiration of the people on development. In the economic reform, Nepal adopted three philosophies: privatization, liberalization and globalization as a key economic policy trust to respond to key macroeconomic issues: poverty, unemployment, and slower economic growth rate, along with following the people's aspirations and desires for big shocks and development miracles (NPC, 1992). In

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the reform period, the government liberalized both external & internal sectors. Tariff and non-tariff were adjusted to promote free flow of goods and services to be integrated with regional and global markets. Similarly, in the internal sector, all sectors were opened up for private as well as foreign investment. All markets were liberalized to make competitive market through the privatization of public enterprises, and removing subsidy and protective measures. In the process, approximately 46 units of public enterprises were sold to the private sector. Foreign Direct Investment (FDI) and Technological Transfer Policy (1992) opened all sectors (industry, agriculture, and service sector) to PI and FDI, as did FDI-friendly sector policies in industry, agriculture, service, tourism, and trade (HMG, 1993). In order to reduce procedural and administrative barriers related to tax and access to credit, value added tax (VAT) was introduced and interest was liberalized (MoI, 1993).

Nepal expected the positive implication of the reform on firm's factor productivity because the reform was expected to attract FDI and PI, accelerate the transfer of technology and knowledge, and promote fair and competitive financial and product markets, import substitution and export promotion industries, technological productivity and efficiency, massive employment generation, and the growth of industrial production and productivity (MoI, 1996). However, a reality is different to the expectation. Firstly, the reform could not assure Multinational Corporations (MNCs) to invest in Nepal. FDI size is still less than 1 percent that is less than the average FDI inflow in South Asia. Secondly, FDI inflow is not as expected in priority sectors. MoF (2018) shows its effectiveness in terms of FDI inflow to some extent in the comparative advantage areas, primarily in hydropower, manufacturing, tourism, service sectors, etc. Therefore, the result of the reform differs to the expectation of Nepal.

Concerning FDI, the expectation in the ex-ante of the reform was a best destination of MNCs, crowding out effect of FDI firms, and a positive spillover effects of FDI in India and China on high factor productivity of labor and raw materials induced high scale production possibility curve of industrial sector, increasing import substitution opportunity, the growth of export trade, and macro-economic stability and growth. It was natural because of the reasons: a) cheap labor; b) immense water resources and unique natural beauty; c) favorable special fiscal and monetary packages; d) no restrictions on share equity and nature of investment; e) open to all economic sectors, except national sensitive areas (security and media); f) one window policy and priority to FDI (Bista, 2005, 2021; NPC, 2020). In the TFP of Firms, FDI can positively transform because of a) FDI and new technology nexus; b) markets of mother company and Country; c) high potential scale of production; d) lower transaction cost; e) international brand, f) benefits of Research and Development of mother MNCs and g) global network (NPC, 1997; Bista, 2005). Therefore, economic reform can contribute to TFP of FDI firms through technological transfer and entrepreneurial skill.

In this context, this paper examines whether the performance of FDI firms in Nepal is better and whether the total factor productivity (TFP) of the firm is higher. The outcome of the study would be valuable to contribute on foreign direct investment (FDI) policy, management and administration for attracting FDI in Nepal and to contribute to the policy guidelines for the positive implication of factor productivity. The issue of FTFP is a key issue expected to be dealt in this paper.

2. Literature Review

In recent years, FDI has become a major external capital in developing countries (Makiela & Ouattara, 2018) as a substitute of foreign debt and aid. It does not mean positive implication on economic growth. The profit motive FDI may hurt the local and national economy because FDI aims to repatriate profits in mother country; FDI doesn't maintain CSR at the local community and positive linkage with local enterprises; FDI does not care about environmental losses and crowding out domestic investment (OECD, 2002)

Despite expecting a positive implication of FDI on TFG, FDI is a profit driven investment. Wang et al. (2022), and Ayenew and Wang (2022) point out the positive dynamic relationship between FDI and economic growth. In this relationship, Simionescu and Naros (2019) argue the positive influence of FDI to improve the economy and quality of human resources. Torieb (2015) opined investment as an engine of human development. Alfarro (2017) widely explained FDI as a source of investment, advanced technology and improved managerial skills for improving economic growth. Similarly, Makiela and Ouattara (2018) mentions the benefit of FDI as technology transfer, human capital development, job creation, increased competitiveness, and export growth. Economic growth is induced by the industrialization process and industrial growth. Ayenew and Wang (2022) found that FDI has a favorable and significant effect in the long run but it is statistically insignificant in the short run. The study concludes that foreign direct investment boosts long-term economic growth. As a result, countries in Sub-Saharan Africa should focus on attracting foreign direct investment. Theoretically, Hymer (1976) explains FDI firms as a vehicle to transfer capital, management, and new technology, having positive effects on production and productivity. These empirical literatures argue similar to theoretical literature of Harrod-Domar growth model (1946). In the model, investment is explained as an engine of growth. This is similar to the argument of Liesbeth et al. (2009). Regmi (2004) claims foreign capital is an important investment in the GDP growth of Nepal because Poudyal (1987) stresses a high investment ratio as an important determinant of economic growth, much like in the classical theories of growth. Thus, theoretical and empirical literatures consider FDI as an engine of economic growth. However, its contribution to economic growth is empirically controversial yet.

Differently, FDI is theoretically and empirically said as a supernormal profit seeker through tax evasion and no corporate social responsibility (Ayenew & Wang, 2022; Makiela & Ouattara, 2018). Multi-National Corporations (MNCs) are global corporations. MNC's turnover and investment sizes are larger than the host country's economy. They follow higher economics of scale with optimal factor's productivity and minimum cost (Ayenew & Wang, 2022; Makiela & Ouattara, 2018). In Nepal, the relevant literatures are very few. This study has critically reviewed these issues. Bista (2017) examined the effects of FDI in Nepal through the case study method. His result was a positive effect of FDI on employment, local development, CSR, and economic growth to some extent, despite the small inflow of FDI. The study had not dealt with FDI's effect on industrial productivity. Thapa (2022) analyze the impact of FDI on employment generation in industrial sector of Nepal for the period of 1990-2020. The result of co-integration test indicates that there is no co-integration between foreign direct investment and employment generation. This means a long-run co-integration relation between variable does not exist. The result of Granger causality test shows there is no bidirectional causality between these variables. It is seen that due to the negligible and flexible amount of FDI in Nepal, there is no long-run relationship

between FDI and employment generation. Khatri et al. (2022) investigated the impact of foreign direct investment (FDI) on the stock market development in Nepal. The results suggest that FDI plays significant positive role in the stock market development in the long-run but inversely affect in the short-run. Unidirectional causality running from FDI to stock market development is observed in the long-run and bidirectional in the short-run. There is an insignificant positive relationship between exchange rate and FDI in the short-run. Hasan and Kim (2014) assess the problems and prospects of FDI. The study found political instability as the major driving force to disrupt the smooth flow of FDI for the last two decades and low inward FDI to Nepal caused by poor implementation of existing policy and subjective targeted business exploration. Besides, Bista (2019) accounts total factor productivity of FDI firms in Nepal covering from 1990 to 2014. There is sufficient scope to be dealt with on this issue. This study is relevant in the aspect of TFP of FDI firms, although Bista (2019) studied on this issue only from 1990 to 2014.

The broad objective of this paper is to analyze the performance of FDI firms in Nepal by measuring the total factor productivity (TFP) growth of FDI firms from 1990 to 2018. This study employs Solow Growth model-based econometric models to estimate the TFP of FDI firms by using three factors (capital, labor, and technology).

3. Methodology

This section illustrates the data and methodology employed in this study. This study is designed in the analytical and empirical framework under which 16 years long time-series data sets from 1992 to 2018, covering FDI, real GDP, and labor, were employed. The time series data sets of FDI, and labor were collected from the Department of Industry, Nepal Government. Similarly, the time series of data sets of GDP was collected from the Economic Survey, Ministry of Finance, Nepal. Their validity and reliability were tested by using the Federation of Nepal Chamber of Commerce and Industry, (FNCCI), the Confederation of Nepalese Industry (CNI), and the Nepal Rastra Bank (NRB) websites as supplementary sources of FDI, real GDP, and labor.

The study employed an Excel sheet to insert all databases of FDI, labor, and real GDP for exporting to SPSS. In the Excel sheet, the study estimated the total factor productivity of FDI firms, employing the total factor productivity accounting method. The study used a simple regression to estimate the coefficient mentioned below by the use of SPSS software.

3.1 Model

The model relates to the Solow Growth model and total factor productivity growth accounting based on technology, labor, and capital. At the firm level, Ahluwalia (1991), Balkrishna and Pushpangadan (1994), Bista (2005, 2019), Goldar (2002), Rao (1996), and Trivedi et al. (2000) have used parametric and non-parametric approaches and econometric models to account for the TFP of the industrial sector. This paper employs an econometric model based on the Solow Growth model.

Let us suppose FDI firms invest two inputs, capital (K) and technology transfer (A), in Nepal from their home countries. In the meantime, they assume labor input as a comparative advantage and employ the labor of Nepal (L) as an input in their production and outcomes. The expectation is that they will make

valuable and productive contributions to GDP. Let us present such a relationship in the Cobb-Douglas production function for such FDI firms as

$$Y = A f(K^\theta, L^{1-\theta}) \quad (1)$$

From Eq (1), taking a log then,

$$\ln Y = \ln A + \theta \ln K + (1-\theta) \ln L + e \quad (2)$$

Making Linear equation (2)

$$Y^* = \alpha + \beta K^* + \beta_1 L^* + e \quad (3)$$

Where, α , β and β_1 are parameters which are $\alpha > 1$, $0 < \beta < 1$, and $0 < \beta_1 < 1$,

$$\alpha = \ln A, Y^* = \ln Y, \beta K^* = \theta \ln K, \beta_1 L^* = (1-\theta) \ln L$$

e = error term, which is a random variable.

3.2 Productivity Growth Accounting Method

Let us suppose the simple production function of an FDI firm is $Y = A f(K, L)$ (4)

$$\text{Finally, from differentiating equation (1), we get } \dot{A}/A = \dot{Y}/Y - (\theta \dot{K}/K + (1-\theta) \dot{L}/L) \quad (5)$$

Where, \dot{A}/A denotes the total factor productivity growth of the FDI firm. From a Solow growth perspective, it is a measurement of total factor productivity growth.

3.3 Estimates

Estimates of Input Coefficient " θ "

The data set of econometric models includes three variables, in which GDP (Y) is the dependent variable and FDI (K) and labor (L) are independent variables. The relationship between GDP, FDI, and labor (the number of people employed in FDI firms) was a curiosity. In this study, we focused on two questions:

- What would FDI firm output contribute to the GDP of the country?
- What would be the input share (θ) of capital and $(1-\theta)$ of labor in an FDI firm?

We used time-series aggregate data for GDP, FDI, and labor. We quantitatively answer the first question from the econometric model. From this model, we could interpret the estimated input share values of capital and labor for accounting total factor productivity growth of FDI firms.

Estimates of TFPG

The data set of theoretical models based on the Solow Growth model includes three variables: GDP (Y), FDI (K), and labor (L). The theoretical production function defines Y as dependent and K and L as independent. In the estimation of TFPG, these variables have modified variables in terms of the growth of these variables, along with the unknown productivity variable (A). In this study, we focused on only one question:

- What would be the unknown FDI productivity?

We employed a simple algebraic method to calculate it by using the estimated input shares. Thus, we could interpret the answer to the productivity growth question of FDI firms from a simple calculation.

4. Results

This section presents the results of the study. Table 1 presents the mean and standard deviation of key variables in the C-D econometric model estimation. In column 1, there are three key variables, such as GDP (Y) as the dependent variable and FDI (K) and labor employed in FDI firms (L) as independent variables. The standard deviation of these variables from the mean is not significant. Thus, the mean of these variables represents the proper time series data of GDP (Y), FDI (K), and labor (L) collected from a secondary source.

Table 1: Mean and Standard Deviations: C-D econometric model estimation

Variables	1992-2018
Real GDP(Y)	5.38(1.28)
FDI(K)	3.40(0.96)
Labor(L)	3.12(0.75)

Table 2 provides the results of the regression of the dependent variable, GDP (Y) on two independent variables, FDI (K) and labor (L). There are two parameters: β and β_1 . In the regression results, parameter (β) represents a marginal change in FDI (K), which explains how much more FDI is required to achieve 1% GDP growth under industrial liberalization conditions. Similarly, parameter (β_1) denotes the marginal change of labor (L), which describes how much labor input is required to achieve a 1% increase in GDP.

Table 2: Results of Regressions of Real GDP(lnY), FDI (lnK), Labor (lnL)

Dependent variable: Average Real GDP(Y)			
Regressor	1	2	3
Constant	0.24(0.32)		
FDI(lnK)		0.27 (0.12)	
Labor(lnL)			1.34 (0.16)
$R^2: 0.91, P(\ln K): 0.039, P(\ln L): 0.00$			

Table 3 reveals the results of TFP growth in FDI firms from 1992 to 2018. There is calculated TFP growth of FDI firms from GDP, FDI, and labor along with a share of inputs in the production behavior of FDI firms. Column 1 and column 2 represents TFP growth in FDI firms per annum in percentage. If there is a positive trend in TFP growth, it indicates the occurrence of the positive performance of FDI firms in the national economy. Otherwise, it indicates the occurrence of negative performance.

Table 3: TFP growth in FDI firm, 1992-2018

Year	FP Growth Rate(%per annum)
1992	3.12
1993	7.20
1994	3.25
1995	-9.12
1996	2.19
1997	1.34
1998	-1.25
1999	5.71
2000	0.42
2001	0.11
2002	3.33
2003	4.19
2004	-0.25
2005	-0.94
2006	3.06
2007	-95.21
2008	3.57
2009	3.52
2010	3.19
2011	-4.86
2012	3.61
2013	5.11
2014	-92.82
2015	16.88
2016	12.83
2017	3.12
2018	7.20

Source: Economic Survey, 2020

5. Discussion

The estimated results of the log econometric model provide strong evidence on the input share of FDI (lnK) and labor (lnL) in the FDI firm's production function. In the estimated results of the model, the coefficient value of capital input (K) (β) is 0.27 and P-value is 0.039 at 5 percent critical value. Similarly, the coefficient value of labor input (L) (β_1) is 1.34 and P-value is 0.000 at 5 percent critical value. R2

Figure 1: Histogram

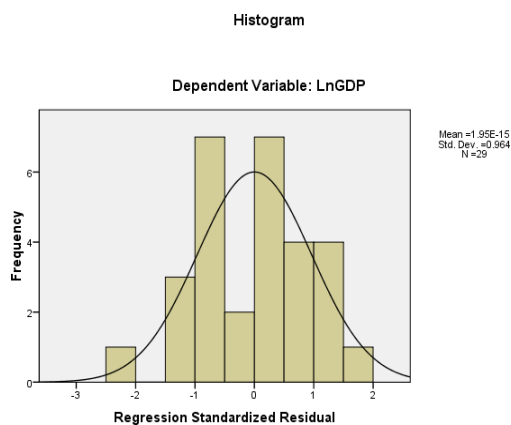
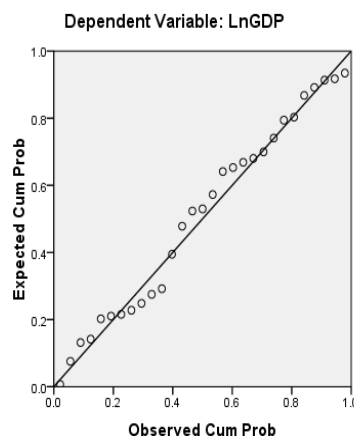


Figure 2: Normal PP Plot

Normal P-P Plot of Regression Standardized Residual



value is 0.91. The estimated result shows the model is goodness to fit because its explanatory capacity is 91 percent. The independent variables including capital and labor explain at 91 percent. Besides, p values for capital (K) and labor (L) show that they have significant relationship with dependent variable (RGDP). The model explains that FDI firms are labor intensive than the capital intensive and productivity of labor is more than productivity of capital to real GDP. Marginal change of capital input is less than marginal change of labor input. Relatively, labor input share is 5 times more than capital input share in FDI firm and than real GDP. It implies cheap labor as comparative advantage factor input to the entry of FDI firms in Nepal. However, 9 percent unobserved variables may be a poor business environment, policy fluctuation and inconsistency, insecurity turbulence, labor skill and knowledge, and so.

The above results show that the average TFP growth in FDI firms from 1992 to 2018 is -4.87 percent per annum, but if we include FDI firms from 1991 to 2018, its average is 25.5 percent. This estimated TFP growth shows a positive trend of TFP in FDI firms per annum. Except for 1995, 1998, 2004, 2005, 2007, 2011, and 2014, the TFP growth of the remaining years from 1991 to 2018 is estimated to be positive, greater than one. TFP growth in 1992, the starting year of the new democratic government, is estimated at 3.12. In 1995, the Maoist insurgents started the people's movement, having negative implications for TFP, that is, -9.12. Similarly, expanding the people's war in 1998 had a -1.25 TFP. In 2004 and 2005, the Maoist aggression period cost -0.24 and -0.25 TFPs, respectively. Then, the Maoist and Seven Parties alliance movement in 2007 was -95.27 percent TFP. In the period from 2011 to 2014, political instability, ethnic movements, earthquakes, and economic blockades had a -4.86 and -92.82 TFP, respectively.

In the remaining years, the estimated TFP growth is positive but is greater than one. In 1992, TFP growth was 3.42 percent. It indicates the positive impact of the economic reform on the Nepalese economy because of the higher growth of private and FDI investment in different economic sectors. It was consistent for two years in a row, 1993 and 1994, with 7.20 and 3.25 TFG, respectively. Then, the swing in TFP growth was -9.12 in 1995. Surprisingly, the following years, 1996 and 1997, had slightly positive TFG of 2.19 and 1.34, respectively. When the people's war was intense, TFG was at -1.25 in 1998. In the remaining years, there are positive TFPs and greater than one. In the years of 1999, 2000, 2001, 2002, and 2003, there were slight increments with 5.71, 0.42, 0.11, 3.33, and 4.19 TFPs till 2003. After 2003, TFPs had -0.25 TFG in 2004 and -0.94 TFG in 2005. In 2006, the TFP was 3.06. In 2007, it was -95.21. Its trend was positive and improving for the previous four years, until 2010. In 2011 and 2016, the result was negative. Currently, the TFP of FDI has been positive since 2017.

These results raise questions: why is TFP growth in FDI firms from 1992 to 2018 is positive but fluctuating (except in a few cases) ?, and why TFP growth in FDI firms is negative in the years 1995, 1998, 2004, 2005, 2007, 2011, and 2014 ? Theoretically and empirically, FDI inflow is determined by the degree of liberalization, comparative benefits (resources, market, and labor), and an investment-friendly business environment. In Nepal, the 1992 economic reform contributed to creating an investment-friendly business environment. Despite the small market, FDI firms had seen the prospects of comparative benefits from cheap labor. In the subsequent years, however, such initiation could not be observed. Then, an investment-friendly business environment and a policy environment were eroded. A growing risk of investment for FDI firms was observed. The growth of non-economic and invisible variables' costs was also found. In addition, Nepalese labor was cheap but unskilled, unorganized, and unprofessional. Comparative advantage is crucial.

When we talk about negative TFPs, they were affected by transitional and unstable politics, and conflict disturbed investment-friendly and business environments. In that condition, the operated FDI firms could not behave normally as required for production behavior and decision-making and smooth trade flow inside and outside the country because of growing risk aversion costs and transaction costs. Otherwise, the cheapest labor in Nepalese might have been a cause because they had lower capacity in terms of skills and knowledge, which the small size of FDI and technological transfer might have caused. In addition, the comparative benefit signals of the operated FDI to potential FDI were not good enough to motivate and encourage them to come to Nepal. Political instability, and weak political will power of the government and party induced industrial policy instability and reliability, which, along with exogenous variable intensity, were demotivation factors for FDI and the private sector. In addition, the policy behavior and faith of political actors were shifting towards socialism instead of globalization, privatization, and liberalization. Its negative factor was discouraging FDI and the private sector from investing further.

The impact of FDI on TFPG is mixed of negative and positive because of insecurity, earthquake, policy instability, and political change. It is similar with the result of Baltabaev (2014). The study argues a positive impact of technology transfer as an instrumental of factor productivity, along with FDI's accumulation. In the backward countries, it would be instrumental to improve ability of technology. Fukao and Murakami (2005) found foreign-owned firms have 10% higher total factor productivity, a higher R&D intensity and higher growth rates of tangible assets and wages. Liu et al. (2016) find that the productivity gap constrains the impact of FDI on TFP, while foreign equity participation enhances technological transfer from foreign partners thus resulting in increased TFP in the Chinese electronic industry (CEI). You and Xiao (2022) found positive spillover effects of FDI and human capital on TFPG in China. Yasin (2022) identify mixed result that, on an average, the manufacturing industry in Indonesia experienced positive TFP growth. However, among 23 subsectors, there are only few subsectors that benefitted from the openness variables. In 2014, 15 out of 23 subsectors experienced negative TFP growth. Xiuwu et al. (2022) found that positive technology spillover of the home country has a significant effect on improving total factor productivity and the technical efficiency index of countries along the route, while the technology spillover of host countries has no significant effect on total factor productivity. Similarly, Yu et al. (2022) argue a cross national knowledge transfer of FDI improves China's TFP and positively impacts FDI, import trade, export trade and direct technology spillover. However, Menon (1998) argue that there is not significant impact of FDI on TFPG of assembling and manufacturing industry in Malaysia. Therefore, it is not necessary that the impact of FDI will be positive on TFPG. It depends on different socio-economic determinants. However, almost countries have positive impact of FDI on TFPG.

6. Conclusion

The study examines the impact of FDI on TFPG in the context that TFPG is an important indicator to measure the performance of FDI firms in the Nepalese economy. The study found evidence of positive TFPG for 17 years, except for a few negative impact on TFPG for six years. In the majority of years, TFPG is positive. In these few years, there are reasons of political and policy instability and conflict. So,

TFP growth in FDI firms is unexpectedly satisfactory not only for GDP growth but also for the FDI firm's performance in terms of output and input share contributions such as FDI, technology, and labor. Furthermore, such spillover effect of FDI and knowledge transfer contributes on aggregate industrial growth and GDP growth, except for few random years. FDI is positive to TFPG and GDP growth. So, FDI and one window policy should be executed effectively and transparently to offer all basic public services under one umbrella as soon as possible and then the government of Nepal should make doing business environment competitive and liberal to attract FDI in those sectors where its TFPG is highly positive.

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