

Intellectual Property Protection and the Debt Trap: Patents, Developing Economies, and Development Policy in the Global South

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Abstract

This paper is an analytical review of the impact of enforcement of the intellectual property rights (IPR) through patent protection and how the protection has contributed to the divergence between the industrially advanced economies of the global north and the agrarian, debt-constrained economies of global south. Using the north-south duopoly model developed by Chin and Grossman (1988,1990) the paper discusses the welfare consequences of the patent protection for the producers and consumers in both regions. By using the World Bank international debt statistics for Pakistan, Sri Lanka, Nigeria, Bangladesh, Ethiopia, and India it situates the framework within the broader question of why the global south has remained locked into low productivity, and agriculture dependent production while accumulating unsustainable levels of external debt. The central argument of the paper documents scale and trajectory of external debt obligations faced by the economies of these countries. They have weak institutional capacity, limited access to patent

protected technology, and structurally underfinanced agricultural sectors that have led to sustained cycle of debt dependency. In the end we have outlined set of public finance-oriented policy recommendations covering research and development investment, agricultural subsidies, and rural credit access with country specific evidence from south Asia and Sub-Saharan Africa.

Keywords: IPP, Debt Trap, Development, Global South, and Developing Economies

1. Introduction

The patent protection holds an uneasy position in the economics of technological change as the incentives to the technological change are different for north and South due to patent protection leading to the innovation in the firms in the north (Diwan & Rodrik, 1989). Within an individual economy, the exclusive rights over an invention allow an inventor to recover the cost of research and development (R&D), resulting in profits and further rounds of innovation. The central feature of economic development is “great transformation” due to the industrialization paving a way for the systematic adoption of the production processes, and new organizational forms due to the new industries and accumulation of knowledge (Polanyi, 1957). This logic underpinned the patent regimes that emerged alongside industrialization in Britain and subsequently across the Western Europe, north American, and parts of East Asia where the patent protection helped channel the private investment into heavy scale investment projects of machinery, transport and communication technologies that became the foundation of modern industrial economies as discussed (Khan, 2026). When extended across the borders, the same protection raises a different and more contested question of how intellectual property rights are enforced not within a single economy but across an international system in which the technological capacity is distributed unevenly. The patent protection, therefore, does more than reward the invention and determines which economies are positioned to capture the returns to new technology and which economies are dependent on the technology developed in other economies.

The distributional consequence is the starting point of this paper and is an extension of (Khan, 2026) that talks about the historical evolution of patent protection dating back to British Industrial revolution. In the analysis (Chitadze, 2019), discusses the rich-north and poor-south concepts polarizing the world into an axis of north-south locating the developed states in the northern hemisphere and the developing states in the southern hemisphere. Around 20% of the world

population lives in the global north and remaining in the global south. The divide of the two hemispheres is imperfect where north is capital intensive, mechanized comprising of heavy industries whereas, the south is reliant mainly on the agriculture and labor-intensive production with a few or no technology-based industries. Going back to the consequences of the distribution of technological resources, (Lai & Qiu, 2003) entails the Uruguay trade agreement GATT¹ on TRIPS² to set minimum standards on IPR protection. The main consequence of this trade agreement was to strengthen the legal protection of IPR enforcing the south to harmonize the IPR standards in line with the north. On the contrary, the south is not doing enough to protect the IPR, and the authors question the standards adopted by the south to protect the IPR to improve the world's welfare.

The economies with systematic research and development (R&D) capacity can use the patent protection to secure a durable competitive advantage in the production of high value goods, whereas economies without R&D capacity are left to choose between paying for access to protected technology. They attempt to imitate it at the risk of infringement or continuously rely on the rational, lower productivity methods of production available to them domestically. The options do not offer the economy of global south an easy route into capital intensive production, and it has a consequence for these economies to finance their own development.

Their weak positions are clearly visible in the external debt positions of agrarian economies across the south Asia and Sub-Saharan Africa. Countries in the global south such as Pakistan, Sri Lanka, Nigeria, Bangladesh, Ethiopia and India have borrowed extensively to finance the infrastructure, industrial development and balance of payment support often through international financial institutions. Of these listed countries, Pakistan and Sri Lanka relies more on the financial institutions, whereas, India, and Nigeria do not rely heavily on the international financial institutions. The resulting investment due to borrowings often fails to generate productivity gains needed to cover up the borrowings, whether because of weak institutional capacity, exogenous shocks such as floods and price fluctuations or the structural disadvantage of competing against technologically advanced producers. Therefore, these economies are drawn into a cycle of

¹ GATT is the General Agreement on Trade and Tariff that was signed for the first time in 1947 for the global economic recovery after the World War II

² TRIPS is the agreement on the Trade Related Aspects of Intellectual Property Rights that was formed by WTO to set minimum global standards for protection and enforcement of Intellectual Property Rights

repayment of debt through the share of public revenue that is directed towards debt servicing rather than productive investment opportunities.

It is this debt trap that we have discussed in this article by defining it not only as a repayment debt amount but a self-reinforcing condition in which the debt itself constraints the investment that would be needed to grow out of it. Pakistan is a recurring point of reference throughout the paper, as it has the highest debt-to-GDP ratio among the listed countries and is vulnerable to exogenous shocks of natural disasters, causing long-standing gaps in the economic policy implementation.

We bring up two strands of arguments in the paper, first the distributional consequences of intellectual property rights enforcement and second the debt dynamics of countries in the south. We have discussed what a north-south model of patent protection implies for the welfare of technologically dependent economies over the last decade. The main intention of the analysis is not to give a comprehensive account of under-development, nor to make a claim that IPR enforcement is the primary cause of debt traps for the developing economies. Instead, the main objective in the paper is to show that the two are inter-connected, the IPR is designed around the technologically developed economies in the north that is causing a structural constraint on the economies that have a few industries which are not heavily mechanized to compete with the industrial north.

The composition of the paper is as follows: the introduction is followed by Section 2, which presents the theoretical framework; Section 3 provides the discussion; and Section 4 considers development policy. Section 5 concludes the analysis and is followed by references section.

2. Theoretical Framework

To set out the framework for the welfare consequences of extending a patent protection geography, there are two identifying assumptions laid out by (Oddi, 1987) that need to be understood first followed by a third assumption.

1. The need for more inventions in the developing country
2. Granting patents is an efficient way of creating incentives for inventions
3. Granting of patents leads to development

The development goals of a developing country are different than a developed country, therefore, their development needs are basic, and they lack the ability to assimilate the latest technology in their industrial set-up. The importance of first two assumptions directs towards the provision of incentives pointing towards the realities in contrast to the opportunities that are available in the developed countries. Due to this the inventions in the developing countries are limited.

Therefore, (Chin & Grossman, 1990) analyze the incentives that the government in the south protects the IPR of the firms in the north. The patent protection helps benefit the developed country by lowering the cost of production due to the technology used in the invention and innovation but on the contrary, it cannot be seen in the global south. The authors presented model for a single north and south producer selling their good to an integrated world market. While producing the good only north has the resources and ability for R&D and south does not have, due to the low production cost of the former only. This results in a higher social cost of welfare in the south as the production costs are higher giving them a limited benefit outside their borders in comparison to the north, the main consequence of this difference is giving the north product a higher value in the global market in comparison to the south.

How this associates with the developing countries who are facing the burden of repayment of huge debts, further raising their cost of production?. We will elaborate the impact of foreign patenting on the average spill-over opportunities on the local firms as analyzed by (Moore et al., 2023). For the local firms to enhance their capabilities to produce more without investing in the R&D, induces them to take more debt encouraging the firms to compete the foreign investors in production and distribution efficiency. The main argument of the authors is that this borrowing will increase the debt of the borrowing country raising the debt level at the higher levels of IPR protection and lower levels of the need for R&D. By investing the minimum amount in the R&D, it will allow the local firms of these countries to take on more debt, keeping the local firms in a position where they are not able to seek efficiency in the production to get the highest benefits from investment opportunities that are already limited. In a detailed analysis by (Paul et al., 2026) by analyzing the effects of debt on 148 countries from 1991-2022 given the current account balance, intellectual property license fee on foreign direct investment. The average central government debt among these countries is 54.55% of GDP, whereas the average debt of the service is 14.74% of the export goods. There is a positive relationship between the foreign investment and central government

debt stock, current account balance, and the charges for IPR. There is a negative relationship between the foreign direct investment and the current account balance. By increasing the financial development, the adverse impact of foreign debt can be reduced.

We have analyzed the welfare consequences of extending patent protection geographically. IPR are divided into two categories, first the copyrights, that covers the rights of authors, artists, and performers over literary, artistic, and creative works and second, the industrial property that covers the rights attached to inventions, designs, and the identification of goods with a particular origin. The discussion in the paper is focused on the industrial property patents with the purpose of IPR to be defined to incentivize and finance the research activity. It is the industrial patents that determines the terms on which new production technology diffuses between economies. As mentioned, the global south has limited capacity to generate patentable innovation themselves, correspondingly limited ability to capture the benefits that IPR enforcement is meant to confer.

(Krugman, 1979) two regional general equilibrium model was extended by (Helpman, 1992) to examine how IPR restrictions affect the terms of trade, production and consumption across regions. As the technological development in the developing economies is constrained largely by imitation, a strict two region division is informative for newly industrialized economies. The economies with enough absorptive capacity to adopt and market imported technology rather than for the least industrialized traditional economies that largely rely on labor and weakly designed mechanized modes of production. As (Chin & Grossman, 1990) specifies the conditions under which the global enforcement of patent protection through IPR produces a net welfare loss, and which provides a rationale for evaluating whether harmonized IPR regimes serves the interest of the economies that are subject to them. Because the world is dominated by a few technologically advanced economies, the IPR is designed as an enforcement that benefits disproportionately their interests by limiting the imitation of the products due to restrictions and allowing them to extract monopoly rents on newly introduced technology. The counterfactual to the enforcement is not necessarily beneficial to the south either, since the absence of protection increases the risk of piracy and infringement that will ultimately benefit the lowly developed economies with low investment in R&D instead of fostering their own innovative capacity.

2.1 North South Duopoly Model

The (Chin & Grossman, 1990) framework assumes a northern firm and a southern firm, both initially producing a good demanded in both countries using existing unprotected technology. The northern firm has research and development capability and can therefore improve its production technology over time. Where the south protects the north's intellectual property rights, the northern firm captures a competitive advantage through its R&D effort, which under some parameter values yields it an oligopolistic advantage a larger market share and the ability to license its superior technology to the southern firm on favorable terms. If, instead, the assumption of IPR protection is dropped, the southern firm gains the ability to imitate the northern firm's technology without incurring R&D costs, which erodes the north's technological advantage and shifts the competitive balance toward symmetric duopoly.

The welfare questions that arise is, how far patent protection by the south can be justified in terms of national and global welfare. The stated rationale for global patent protection is that it stimulates innovation and, in doing so, lowers production costs an outcome that should in principle benefit both regions. In the model, however, enforcement also weakens the oligopolistic competition between the two firms, which can reduce welfare in both north and south even as it lowers costs in the north. The distributional effect works against the south specifically, because IPR enforcement allows the north to capture a disproportionate share of super-normal profits, the south's national welfare depends heavily on how much of world consumption of the protected good it accounts for. Where the south fails to enforce northern IPR, the resulting market structure resembles a symmetric duopoly, and the north firm, anticipating this at the R&D stage, adjusts its investment accordingly. Modest R&D investment when anticipated returns are low, and more aggressive cost-reducing investment potentially approaching monopoly control of the product market when anticipated returns are high.

Under weak IPR enforcement, the south achieves higher national welfare when the resulting duopoly outcome allows it to consume more of the good at reduced cost, given its share of world consumption; strict IPR enforcement, by contrast, allows the north to secure a monopoly position. The conflict of interest between the two regions is therefore structural, rooted in the IPR regime itself rather than in any single policy choice. Licensing offers one route to reconciling these interests as once R&D is complete, the southern firm may negotiate a license for the northern

firm's technology, which is generally profitable for the north if enforced through contract. However, absent enforceable IPR, the south has little incentive to pay a positive licensing fee when imitation is available at no cost. The north's bargaining power in licensing negotiations is therefore itself a function of how credibly IPR can be enforced. Overall, IPR protection tends to raise global efficiency specifically when R&D productivity and the pace of innovation are high and where the south has a substantial share of the relevant market and scope for technological catch-up, IPR enforcement additionally serves to prevent firms from appropriating technology from one another, which is one reason industrialized economies have consistently pressed developing economies to adopt stronger patent regimes.

3. Discussion

3.1 Rural Agrarian Economies and the Debt Trap

The welfare asymmetries described in section 2 have a direct bearing on why many economies of the Global south remain agrarian and debt constrained. Global trade continues to be organized around the classical logic of absolute and comparative advantage, but the returns to that trade are distributed unevenly. Economies able to deploy capital-intensive, technologically advanced production not only in manufacturing and transport but increasingly in communications and digital services have continued to pull ahead of economies still reliant on labor-intensive, traditional production methods. Global interconnection, including the near-instantaneous diffusion of consumer technology across markets, has not translated into converging productive capacity.

Economies of the Global north are characterized by high levels of industrialization, high literacy, and low poverty, the economies of the Global south, by contrast, remain reliant on agriculture, limited mechanization, and traditional labor-intensive production. In many cases this is not simply a matter of resource endowment, even where natural resources exist, limited income constraints the capacity of the workforce to acquire and apply capital-intensive technology.

(Amin, 2013) situates this pattern within the broader process of centralized capital accumulation, tracing its consolidation in the United States from the 1920s and in Western Europe and Japan after the Second World War. In his account, the monopolies generated through globalization exercise disproportionate control over the resources of peripheral economies, producing a systematic imbalance in the financialization of the world economy. Capital is channeled into heavy

industry in the north while remaining tied to agricultural and traditional production in the south, with the former generating substantially higher returns available for reinvestment. This is not a claim that industrialized economies neglect agriculture rather, they have transitioned to mechanized agrarian systems that combine advanced ploughing, irrigation, and harvesting technology with a shrinking agricultural labor force, achieving higher output with fewer workers. That transition has not occurred at comparable scale in the Global south, in part because agricultural production there has not been integrated into global capital markets in the way industrial capitalism was.

The relationship between agricultural and industrial development is itself contested in the literature. (Mellor, 1962) identifies several channels through which agriculture can support industrialization in developing economies linking agricultural and industrial labor markets and supplying urban populations with food produced by the rural sector through which financial surpluses generated in the traditional sector can help finance industrial imports. (Byres, 2012) similarly argues that successful industrialization depends on parallel development of the agricultural sector, mechanizing agrarian productivity while also strengthening domestic markets. (Bernstein, 2009) takes a different position, arguing that industrial and agricultural development need not be directly linked for the industrial sector to grow. On this reading, the constraint facing developing economies is less about sectoral linkages and more about their entanglement in globalized circuits of capital controlled by developed economy circuits that are difficult to penetrate given limited resources, human capital, and financing. Where developing economies borrow to finance ambitious development projects and those projects fail to meet their targets, the resulting shortfall pushes them into a cycle of debt repayment that delays or cancels other planned investment, with knock-on effects on unemployment, inflation, growth, and poverty.

Table 1: International Debt Statistics, Selected Years (US\$ millions, unless noted)

Country	Item	2014	2016	2018	2020	2022	Debt-to-GDP Ratio (2022)
Pakistan	Total external debt stocks	64,359.9	75,206.4	100,199.1	118,049.2	126,942.2	72.4%
	Principal repayments	2,034.0	3,007.8	3,327.3	7,189.7	12,169.3	
	Interest payments	759.6	1,227.4	2,273.6	2,257.9	3,196.5	
Sri Lanka	Total external debt stocks	42,262.8	46,661.5	52,919.7	56,874.4	58,712.7	115.54%

	Principal repayments	4,912.6	1,701.9	5,522.8	3,322.7	2,018.2	
	Interest payments	704.4	989.7	1,546.4	1,589.6	787.3	
Nigeria	Total external debt stocks	41,804.7	41,359.6	66,565.6	82,833.3	98,335.3	39.6%
	Principal repayments	2,691.2	3,025.6	4,942.3	4,242.8	5,049.5	
	Interest payments	266.9	640.3	1,412.1	1,811.4	1,943.9	
Bangladesh	Total external debt stocks	35,271.8	41,569.3	57,125.5	73,550.9	97,011.7	37.9%
	Principal repayments	1,547.2	1,325.4	2,033.2	2,871.4	5,140.6	
	Interest payments	360.4	376.6	640.9	862.6	1,036.6	
Ethiopia	Total external debt stocks	16,946.0	23,396.7	27,842.5	20,363.9	28,610.1	44.7%
	Principal repayments	562.8	770.8	1,138.3	1,370.7	1,534.6	
	Interest payments	187.8	397.4	436.3	599.3	458.6	
India	Total external debt stocks	457,507.4	455,541.9	521,175.7	564,979.3	616,863.0	81.6%
	Principal repayments	80,786.5	65,971.1	46,229.3	63,443.7	44,379.0	
	Interest payments	10,971.2	9,540.4	13,975.8	11,197.4	15,077.7	

Source: World Bank (2023), International Debt Statistics.

External debt for Pakistan, Bangladesh, and Nigeria has risen steadily from 2014-2022. Bangladesh reports one of the lowest debt-to-GDP ratios among the six economies, with repayments increasing only moderately consistent with a textile- and garment-led industrial base that has reduced, though not eliminated, its dependence on agriculture. Nigeria's debt-to-GDP ratio is likewise comparatively low, with principal repayments growing at a controlled pace. India's external debt burden is large in absolute terms but is accompanied by evidence of improving debt management. Ethiopia's repayment obligations are lower in absolute terms than Nigeria's, but because its GDP base is smaller, its debt-to-GDP ratio remains comparatively high. Pakistan and Sri Lanka stand out with markedly higher debt-to-GDP ratios and more volatile principal repayments, reflecting sustained financial pressure and, in Sri Lanka's case, an acute political and economic crisis.

In Pakistan's case, existing empirical work "The Stability of Pakistan Economy and IMF Deals: An Analysis," (van der Eng, 2024) attributes much of the recent deterioration to the 2022 floods. It damaged roads, canal, and railway infrastructure and reduced agricultural output through widespread crop failure, contributing to rising unemployment, a widening current account deficit, and higher debt-servicing costs. The floods are not, in this paper's reading, a sufficient explanation

on their own; longstanding gaps in the implementation of development-oriented economic policy have compounded the effects. Sri Lanka's exposure to rising debt obligations has similarly interacted with domestic political instability to produce an economic crisis that will likely require a sustained macroeconomic stabilization program, potentially involving the IMF, to resolve it.

3.2 The Agrarian Trap and the Role of Public Finance

Public finance defined by (Grueber, 2019) as the branch of economics concerned with the government's role in the economy offers one route out of the pattern of debt traps. Governments influence economic outcomes through the goods and services they provide and through the sectoral allocation of public investment in infrastructure, institutional capacity, employment and poverty-reduction programs, and support for sectors judged central to growth. Industrialized economies have generally paired public finance with strong institutional capacity to support high-productivity, technologically advanced agricultural sectors. Developing economies, particularly across the Global south, are still working to build the legislative and institutional frameworks needed to support comparable agricultural growth.

The record on agricultural financing is mixed. In Poland and Hungary, financing tied to the European Union's Common Agricultural Policy supported measurable structural change between 2000 and 2011, it increased concentration of production in Poland's food industry and growth in Hungary's food-industry microenterprises (J. Fogarasi et al., 2014). By contrast, in Sub-Saharan Africa, where roughly 70% of the population depends on traditional agrarian food production, financial support for agriculture declined between 1980 and 2002 even as the potential returns to investment in the sector remained clear largely because Official Development Assistance was redirected toward social sectors such as education and health as a more direct route to poverty reduction (Odhiambo, 2007). These contrasting outcomes suggest that the effectiveness of agricultural public finance depends as much on institutional follow-through and competing budgetary priorities as on the availability of funds.

4. Development Policy: Recommendations and Evidence

Public expenditure on agriculture in developing economies across Asia and Africa was relatively low as a share of GDP between 1980 and 1990, before recovering by 2002 (Akroyd & Smith, 2007). The recommendations below drawn on evidence from economies discussed in Table 1 to identify where public finance has been more and less effective in reducing agrarian dependency.

4.1 Investment in Research and Development

Because technological improvement has historically driven shifts in productive capacity, agrarian economies stand to benefit from research targeted at their specific vulnerabilities drought-resistant techniques, flood-mitigation infrastructure, and co-location of agri-processing industries with agricultural zones to reduce transport costs and improve labor access. In Pakistan, R&D investment has supported more effective use of available cultivable land, more efficient labor allocation, and, in turn, reductions in poverty and gains in agricultural capital accumulation. India offers a stronger institutional model, the Indian Council of Agricultural Research (ICAR) has coordinated public agricultural research investment that has roughly doubled since the 1990s, spanning environmental monitoring, fisheries, crop science, natural resource management, and agricultural engineering, with government and academic institutions jointly involved in setting priorities (Pal et al., 2012; Zaman et al., 2023). Ethiopia illustrates the limits of R&D investment absent strong policy uptake, despite significant R&D spending between 2001 and 2016, food import dependence has persisted, in part because the evidence generated by agricultural research has not been effectively incorporated into Ministry of Agriculture policymaking (Carden et al., 2019).

4.2 Subsidies to Support Agricultural Productivity

Subsidies lower production costs for farmers and can encourage adoption of improved production techniques. In Bangladesh, the agricultural sector's share of GDP has fallen from roughly 60% in 1971 to about 12% today, even though the sector still employed close to half the workforce in the earlier period that is a shift attributable in large part to cropland reallocation as the industrial sector expanded (Chowhan et al., 2024). Within agriculture, fertilizer subsidies remain an important policy lever, and Bangladesh's 2010 input-assistance card program, which linked farmers' accounts to direct payment for input purchases, is generally regarded as an effective

implementation model. Nigeria's experience is less encouraging, as its 2012 fertilizer subsidy scheme showed little measurable effect on yields for rice, maize, or sorghum before and after harvest, a result attributed to weaknesses in marketing and production structures and to the subsidy's design, which benefited producers directly without a mechanism to pass on longer-term gains to consumers (Takeshima & Liverpool-Tasie, 2015).

4.3 Rural Credit Facilities

Access to credit remains limited and uneven among small land-holding farmers. In Ethiopia, only about 35–36% of farmers have access to credit for farming activity, with demand for credit constrained by high borrowing costs, risk aversion, financial illiteracy, and persistent gender disparities in access, where men obtain credit more readily than women (Balana et al., 2022). In Pakistan, district-level analysis of the agricultural credit system finds a negative relationship between food-insecure population and access to institutional agricultural credit in Punjab, though non-institutional credit shows a more favorable relationship with food availability (Iftikhar & Mahmood, 2017). This suggests that formal credit systems in Pakistan would benefit from being made more accessible to small landholders relative to medium and large ones, since the current allocation appears to leave the most food-insecure populations underserved.

These areas of research and development, targeted subsidies, and rural credit are not an exhaustive policy menu, and their effectiveness depends heavily on implementation quality rather than funding levels alone. A recurring theme across the country evidence above is that agrarian economies with stronger institutional coordination such as India's ICAR, Bangladesh's input-assistance program have translated public finance into measurable outcomes more consistently than economies where policy design or institutional follow-through has lagged (Ethiopia's R&D-to-policy gap, Nigeria's subsidy design).

5. Conclusion

The debt positions summarized in Table 1 points to a shared constraint that are faced by the economies of the Global south, with limited fiscal space, driven by debt-servicing obligations. It restricts the capacity to invest in the kind of capital-intensive, technologically advanced production that historically enabled industrialized economies to escape agrarian dependency. Overcoming this

constraint requires policy discipline that cannot be sustained by the institutions of less developing countries. The fiscal room to sustain development, particularly where international lenders such as the IMF condition financing on tax increases, tariff adjustments, or trade restrictions carry their own short-run costs. Among the economies discussed Pakistan and Sri Lanka have a substantial share of public expenditure that is absorbed by recurring obligations such as public-sector wages, leaving comparatively little room for the kind of sustained agricultural and R&D investment.

Economies that have drawn on the industrialization experience of China or the United States, such as Brazil, Cambodia, Kenya, and Ghana continue to face tariff barriers and high capital and technology costs that limits how far they can converge toward the production levels of more industrialized economies. This suggests that public policy interventions in agrarian economies are more likely to succeed when introduced incrementally and targeted at specific, well-evidenced constraints. As in the R&D, subsidy, and credit examples rather than concentrated in a single large-scale industrial push that risks diverting resources from other sectors and compounding existing debt pressures.

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7. Conflict of Interest

The authors declare that there is no conflict of interest.

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