Development Economics: Referee Report

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The following referee report pertains to the 2011 publication 'Growing Like China,' published in the American Economic Review by Z. Song, K. Storesletten, and F. Zilibotti. This referee report proceeds in a series of sections. First, I will summarize the contents of the paper. Second, I will provide comments which highlight the unique contributions of the paper, as well as criticisms pertaining to its shortcomings. Lastly, I will outline an empirical and theoretical extension to the paper which will aim to improve upon the shortcomings of the publication and address some relevant questions which were left unanswered by it. Overall, the purpose of this referee report is to account for the academic contributions made by the publication, whilst also identifying remaining knowledge gaps for future research projects.

I will begin with a summary of the publication. The authors begin by recounting that the first market-oriented reforms of the Chinese economy were implemented by Deng Xiaoping in 1978 - the period of structural change beginning at this time was underscored by rapid economic growth and resource reallocation within the manufacturing sector. Multiple noteworthy stylized facts presented by the authors characterize the state of the Chinese economy during this period. The manufacturing sector undergoes a shift away from the numerical dominance of state-owned firms towards a meteoric multiplication of domestic private enterprises (DPEs). New domestic private enterprises prove to be significantly more productive and profitable than their state-owned counterparts, consistently exhibiting 9% higher profits on average and a TFP advantage of up to a factor of 2.3. These private enterprises appear to drive the country's accelerated accumulation of foreign reserves, as net surpluses become systemicatically larger in DPE-dense provinces. The flourishing of private enterprises drives up entrepreneurial incomes, which quickly outpace stagnating worker wages and precipitate a sudden widening of the income distribution. The relative success of the private sector over the course of the transition stands in contrast to the financial and contractual imperfections which systematically repress DPE development. The authors emphasize that largely state-owned Chinese banks provide preferential credit market access to state-owned enterprises, which isn't otherwise available to their private counterparts. As a result, state-owned enterprises finance a significantly larger share of their investments through bank loans as compared to DPEs, the latter having to rely largely on retained earnings. De-

spite being less efficient, preferential treatment allows state-owned enterprises to dominate capital-intensive production, leaving DPEs to specialize in the labor-intensive sector. Overall, the incommensurability of constant investment-driven growth, non-decreasing returns to capital, and a growing foreign surplus during the Chinese transition has been labelled the "allocation puzzle."

The author's propose a baseline model of the Chinese economic transition in order to explain the occurrence of the "allocation puzzle." The authors posit two firm types - financially integrated (F) and entrepreneurial (E) - both hiring workers and one manager. Financially integrated firms are owned by intermediaries, whereas entrepreneurial firms are owned by entrepeneurs that possess superior skills and can operate more productive technologies. Due to a management agency problem, F firm owners cannot effectively monitor their managers and must centralize their corporate governance, whereas entrepreneurs can effectively monitor their managers and delegate authority to them. As a result, E firm production is augmented by a factor χ. Banks collect workers' savings and invest them in domestic loans and foreign bonds. Despite E firms' productive edge, informational asymmetries between entrepreneurs and banks leave E firms credit constrained, unable to borrow to the same degree as F firms. Within this theoretical context, the Chinese economic transition proceeds as follows. Assuming a sufficiently large productivity gap betwen E firms and F firms, the employment, capital and output of E firms grow at a constant rate throughout the transition. The equilibrium dynamics of F firms are characterized residually in relation to those of the E firms. As E firms' employment share increases, the employment share of F firms gradually decreases. As E firms expand, F firms' growth rate of capital first increases before decreasing and becoming negative. At the end of the transition, all F firms exit the economy, leaving only E firms to employ and produce output. The dynamics of this model capture well the empirical reality of the Chinese transition and address all three aspects of the "allocation puzzle." In the theory, GDP per worker grows at an accelerating rate due to the aggregate TFP gains that accrue as capital and labor gradually reallocate towards more productive E firms. The average rate of return to capital increases throughout the transition due to a composition effect, since the rates of return to capital in E and F firms are constant and the more productive E firms slowly overtake the F firms as time progresses. At the same time, the aggregate demand for bank loans decreases as F firms shrink, meaning that banks lose their preferred clients and are forced to reorient their portfolios towards foreign bonds. This results in China's growing foreign surplus.

Although the authors' baseline model accounts well for the empirical reality of the Chinese economic transition and seemingly solves the "allocation puzzle," a number of questionable assumptions and empirical contradictions remain. The authors highlight that the present model assumes a competitive and frictionless labor market, which facilitates the transition of workers from F firms to E firms. In reality, the Chinese labor market significantly deviates from the competitive and frictionless abstraction - in particular, the hukou household registration sys-

tem significantly inhibits the mobility of individual workers and slows the rate of structural change. Although this arguably significant friction is absent from the present paper's model, it is fair to say that the primary objective of the publication was to reconcile certain seemingly incommensurable stylized facts with two firm-centered phenomena, namely preferential credit access for state-owned enterprises and the productive superiority of private firms. As such, adding an imperfect labour market would be a relatively simple extension which falls outside the relevant scope of the present paper. More concerning is the fact that the baseline model predicts a falling rate of investment, whereas empirically no such falling investment rate is observed during the Chinese transition. The authors posit that this falling investment rate can be corrected in the model by inducing generalized capital deepening through a reduction in financial frictions during the transition. However, the introduction of this mechanism generates falling averate rates of return for both F and E firms in the calibrated model, although the opposite is observed in reality. The authors posit the presence of additional sources of efficiency gains within F and E firms which offset the decreasing returns. Unfortunately, the theoretical extension that they suggest to account for this is a relatively ad hoc addition of within-group heterogeneity, which can't be applied to F firms without also relaxing the assumption about their preferential treatment within the credit market. In short, the authors posit a brief theoretical extension to account for an empirical inconsistency, only to generate another empirical inconsistency, to which they posit a second extension that would detract from one of the central theoretical elements of the present publication.

I will now suggest an extension to the baseline model of the publication that should correct the fall in the rate of investment and average rates of return, whilst also relaxing a core assumption for a more thorough analysis. Rather than positing an exogenous rate of technical change, the extended model assumes that firm owners have the option of investing in technologically innovative research in each period. The research process takes two forms: basic science research and applied science research. Both research processes produce technological innovations which augment the technology factors of firms' production functions. However, technological innovations produced from basic science research are more fundamental and have a greater augmentative impact compared to that of technological innovations produced from applied science research. Furthermore, basic science research is a significantly more capital intensive process as compared to applied science research. Firms are monopolistically competitive and generate rents with which they fund basic and applied scientific research. The model preserves the present publication's assumptions about capital market imperfections and the productive superiority of E firms. Similarly to the present publication's two-sector extension, F firms will specialize in the production of capital-intensive basic science research outputs, whereas E firms will specialize in the production of labor-intensive basic science research outputs. The constant augmentation of F and E firms' technology factors through investment in scientific research generates the additional efficiency gains needed to offset

decreasing returns and match the relevant empirical moments.