

Comments

Thomas Philippon: This discussion focuses on one of the theoretical questions raised by the paper: are credit-constrained firms more sensitive to taxes on retained earnings than unconstrained firms? To assess this issue, I consider a two-period model. Capital, k , is invested in the first period and delivers profits, $f(k)$, in the second period. The firm receives an income of y in the first period. The manager of the firm decides how much to invest, k , how much to borrow, b , and how much income to distribute to current investors, d . To capture credit constraints, I assume that the cost of borrowing is increasing in the amount borrowed, according to a function $c(b)$. Finally, retained earnings are taxed at rate τ . The firm's program is therefore

$$\max_{k,b,d} \frac{f(k)}{1+r} + d - c(b),$$

subject to the resource constraint, $k = b + (1 + \tau)(y - d)$, and the constraint on distributions to current investors, $0 \leq d \leq y$. I consider several cases.

The case of no credit constraint is defined as $c(b) = b$. The solution is $d = y$, $b = k$, and $f'(k) = 1 + r$. The firm obtains a perfect tax arbitrage with a leverage of 100 percent. Investment is unaffected by taxes on retained earnings.

For the case of no borrowing, suppose that b is forced to be zero. This prevents the tax arbitrage. Provided that the marginal product is high enough relative to current income, the firm will choose $d = 0$ and $k = (1 - \tau)y$. In this case, taxes on retained earnings decrease investment. Comparing this result with the previous benchmark suggests that constrained firms should indeed be more tax-sensitive than unconstrained firms. This, however, need not be true.

The case of fake borrowing, in which $b = 0$, hides two separate issues: the presence of credit constraints and the absence of the tax arbitrage. However, it is possible to obtain the tax arbitrage even with no real borrowing. Suppose that a bank is a current investor in the firm. The firm pays $d = y$ to the bank,

and the bank makes a loan $b = y$ to the firm. This allows the firm to pay no taxes, while the bank has no real exposure to the firm. In this equilibrium, $k = y$. Credit constraints are completely binding, but investment does not respond to taxes on retained earnings.

Based on the above discussion, it seems to me that the correct benchmark is a model in which all firms are somewhat constrained, but some are more constrained than others. This model has two types of solutions: the interior solution and the corner solution. In the interior solution, where $d > 0$, the first-order conditions are

$$f'(k) = (1 + r)c'(b)$$

and

$$1 = (1 - \tau)c'(b),$$

provided that $d > 0$. These conditions imply that

$$(1) \quad f'(k) = \frac{1 + r}{1 - \tau}.$$

Investment does not depend on the function $c(\cdot)$, despite the fact that the credit constraint is binding. This is because the firm can adjust its current distributions, and the distribution margin insulates investment at the margin.

In the corner solution, with $d = 0$,

$$(2) \quad \frac{f'(k)}{1 + r} = c'[k - (1 - \tau)y].$$

For firms that do not pay dividends, investment is sensitive to credit constraints at the margin.

The typical classification of firms into groups that are likely to be constrained and groups that are unlikely to be constrained is usually based on current income or on distributions. Suppose then that there are firms with high income, y^H , and firms with low income, y^L . High-income firms are in the interior solution, with positive dividends, while low-income firms are in the corner solution. Based on equations 1 and 2, it is not obvious that the elasticity of investment to taxes is higher for the more constrained groups. It depends on the function, $c(\cdot)$. The answer to the initial question, therefore, is that while it is plausible

that more constrained firms react more to changes in taxes on retained earnings than less constrained ones, this is not necessarily the case.

Claudio Raddatz: In 1982 Chile experienced its largest recession since the Great Depression. Real GDP declined by about 15 percent between 1981 and 1983, while unemployment increased from 10 to around 20 percent, and investment plummeted from 23 to 10 percent of GDP. Despite the magnitude of the crisis, output and especially investment recovered surprisingly fast, with the latter reaching its precrisis level three years after the crisis and increasing to about 25 percent of GDP at the end of the decade. There has long been a consensus in Chile that this investment boom was largely responsible for the performance of the economy after the crisis, but more controversy on the causes of the investment boom. Hsieh and Parker argue that this boom was largely the result of the country's 1984 tax reform, which reduced the tax on retained earnings, and that this finding provides evidence that this type of taxation is particularly harmful in economies with underdeveloped financial markets. The paper thus provides not only a possible explanation for Chile's investment boom, but also exploits the Chilean case to provide evidence on the impact of the tax system across different types of firms and the importance of financial constraints.

Although I agree with the broad argument of the paper, two issues may affect the extent to which the evidence supports its hypothesis and quantitative conclusions. First, during the period of analysis, Chile engaged in multiple structural and policy reforms, which complicates the isolation of the impact of any individual change. Second, at the time of the tax reform, Chile was just starting to recover from a big recession, which means that cyclical effects are a potential concern. I structure the rest of my discussion around these two issues.

The Case of Chile

Chile was a pioneer among developing countries in introducing a series of market-oriented reforms. In the 1970s and 1980s, Chile unilaterally reduced and simplified the existing system of tariffs, privatized a large number of state banks and companies, opened the capital account, and moved from an unfunded defined-benefit pension system to a fully funded defined-contribution system. This abundance of reforms has long represented an "embarrassment of riches" for Chilean economists. On the one hand, Chile would seem to be

the perfect laboratory for studying the impact of a set of structural reforms that are relevant for developing countries. On the other hand, the bunching of reforms in a relatively short period makes it hard to separately identify the impact of each individual one.

Hsieh and Parker deal with the identification problems created by this abundance of reforms in two ways. First, they argue that the specific timing of the investment boom and other variables is unlikely to result from three major structural reforms undertaken in the 1980s—namely, the pension funds reform, the liberalization of the financial markets, and trade liberalization. Second, they exploit the theoretical prediction that the tax reform should have stimulated the investment of firms and sectors that were financially constrained.

While the discussion in the paper covers the most important structural reforms implemented in Chile around 1984, the period also featured some important changes in the conduct of macroeconomic policy. For example, the exchange rate regime underwent radical changes that resulted in a large depreciation of the nominal and real exchange rates: the peso lost 43 percent of its value between 1984 and 1986. The timing of the reform thus coincides with the depreciation, and, to the extent that this depreciation restored the international competitiveness of some Chilean firms, it could account for at least part of the investment boom attributed to the tax reform.¹ After the crisis, Chile entered a structural adjustment program with the International Monetary Fund (IMF) and the World Bank that imposed changes in the conduct of fiscal and monetary policy, and real wages declined about 20 percent. All of these events could have affected the investment rate. Moreover, several of these changes could arguably have had heterogeneous impacts on the investment rates of different industries and thus could contaminate the industry-level evidence unless properly controlled for.²

1. Morandé (1998) argues that some tradables sectors could have benefited significantly from the real depreciation, inducing them to save and invest. Meller (1996) also argues that the persistent depreciation fostered the expansion of the export sector.

2. The paper deals with the possibility that the international competitiveness of externally dependent industries could increase relatively more as a result of the real depreciation by controlling in the regressions for the net exports of an industry before the recession. Although it is not completely clear that industries that had higher net exports under an appreciated currency should experience the largest increases in competitiveness, this approach partly eases this type of concern. However, this strategy does not control for the possibility that more externally dependent sectors could have had lower levels of dollar-denominated debt. According to Meller (1996), 50 percent of bank loans were denominated in dollars before the recession.

In summary, although the evidence presented in the paper is certainly consistent with its main hypothesis and makes for a convincing case, the myriad changes happening in Chile during this period make it difficult to quantify the real importance of the tax reform for the investment boom versus alternative explanations with the available data. Some degree of skepticism with respect to the specific magnitudes reported in the paper is probably healthy.

The Cycle

The tax reform analyzed in the paper was passed in the middle of the worst recession Chile has experienced since the Great Depression. It is thus legitimate to ask to what extent the investment patterns documented in the paper are typical of the recovery phase of a big recession. I focus on the implications of the cyclicity for both the aggregate and sectoral evidence provided in the paper.

Determining the extent to which the pattern of investment documented in the paper can be attributed to a cyclical phenomenon requires assessing this episode against other relevant benchmarks. The two available options in this regard are to compare it with the pattern observed in other Chilean recessions (a within-country benchmark) and to compare it with similar episodes observed in other countries (a cross-country benchmark). Figure 9 illustrates the cyclical pattern of investment during the last three Chilean recessions (1975, 1982, and 1999). Panel A shows the evolution of investment levels in each of these episodes, normalizing the trough of the investment cycle to 100. The depth of the 1982 recession is unusual: the contraction (and recovery) of investment is much larger than in the other two episodes. To compare the patterns, however, it is better to normalize by the size of the recession (peak to trough). This is presented in panel B, which shows that the pattern observed in the 1982 recession is similar to the one seen in 1975, yet clearly different from the much milder 1999 recession. All in all, these comparisons show that the decline and recovery in investment in 1982, although more pronounced, exhibits a pattern that is common to some previous Chilean recessions.

The milder Chilean episodes discussed above may not provide a relevant benchmark, however, given the size of the 1982 recession and its systemic characteristics. If large, systemic crises are special, one may want to compare this episode with other similar crises instead. Figure 10 presents the cyclical behavior of investment in Chile in 1982, together with twenty-two cases of

FIGURE 9. Comparing Cyclical Patterns of Investment in Chilean Recessions

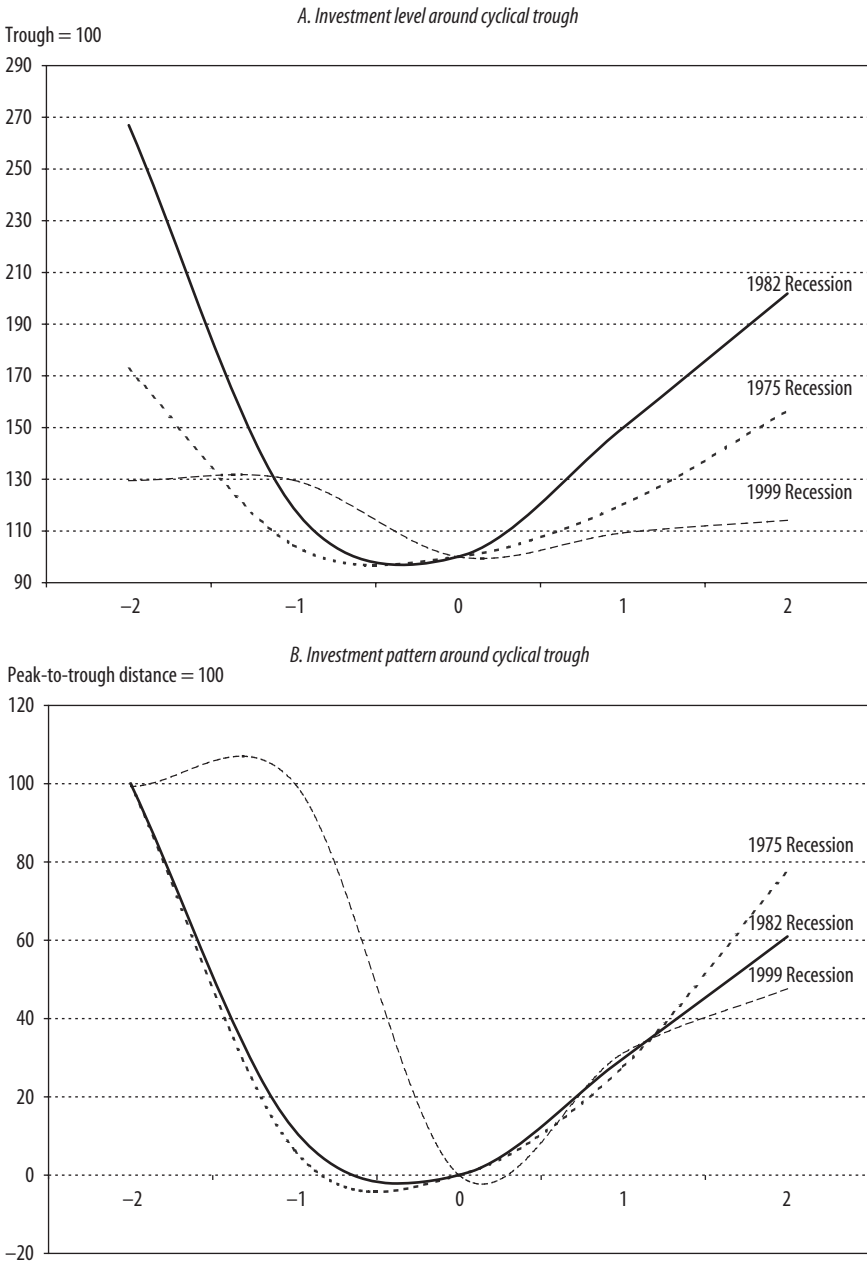
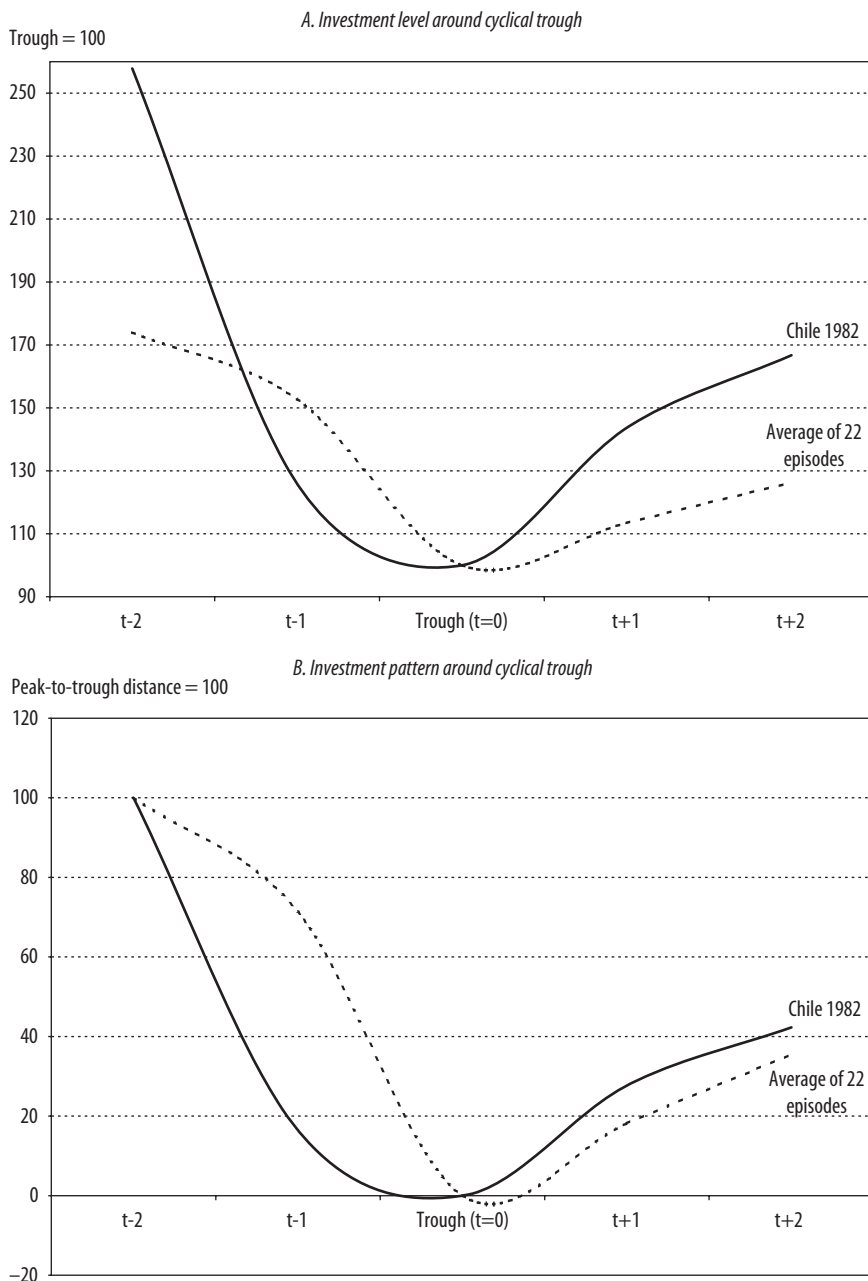


FIGURE 10. Comparing Cyclical Patterns of Investment: Chile 1983 versus a Typical Systemic Sudden Stop Episode



systemic output collapses identified by Calvo, Izquierdo, and Talvi.³ The recession experienced by Chile in 1982 is larger than the average episode, but the overall pattern is similar: real investment recovered about half of its initial value two years after the trough (43 percent in Chile versus 35 percent in the average episode).

A final aspect of the Chilean episode that could be special is the financing of investment through retained earnings. The available data are insufficient for an analysis of the sectoral patterns of corporate versus household savings in other episodes, but existing data strongly suggest that the use of retained earnings (and other internal sources of liquidity) may not be uncommon. As shown by Calvo, Izquierdo, and Talvi, the recoveries observed in these episodes are typically creditless.⁴ Given that international credit is minimal by construction in these episodes, and the intermediated credit flattens out, the only potentially meaningful source of funds to finance an increase in investment is retained earnings.

Overall, the evidence suggests that the size of the Chilean recession is more unusual than its pattern, and it provides some support to the idea that at least part of the investment boom documented in the paper could be a cyclical phenomenon. This does not mean that the tax reform played no role, and the somewhat faster recovery observed in Chile may very well be the consequence of this reform. From a quantitative perspective, however, attributing the whole increase in investment and corporate savings to the reform is probably misleading.

Cyclicalities may also affect the sectoral evidence presented in the paper. Braun and Larraín document that recessions have a relatively larger impact on industries that are more dependent on external finance, especially in financially underdeveloped countries (which is the flip side of the evidence provided by Hsieh and Parker).⁵ The evidence provided in Braun and Larraín's paper is based on a large panel of countries, so it corresponds to a systematic characteristic of the pattern of cyclical fluctuations across industries. The pattern of industrial recoveries documented by Hsieh and Parker, while consistent with the hypothesis that the tax reform eased financial constraints for some firms, is also consistent with the typical pattern of cyclical recovery of industries. Determining whether the Chilean tax reform accentuated this cyclical pattern and quantifying its contribution is a difficult task, but a back-of-the-envelope

3. Calvo, Izquierdo, and Talvi (2006).

4. Calvo, Izquierdo, and Talvi (2006).

5. Braun and Larraín (2005).

calculation suggests that the size of the investment increase documented in this paper is consistent with Braun and Larraín's estimates.⁶

Cyclicalities also raises issues for the firm-level evidence provided in the paper. This evidence indicates that firms that are likely to be financially constrained, based on *ex ante* measures of the correlation between investment and cash flow, increased investment relatively more than unconstrained firms after the reform. While this is certainly consistent with the differential effect of the tax reform, the literature on the credit channel shows that financially constrained firms experience greater cyclical fluctuations in their investment, output, and employment as a result of the cyclicalities of the external financial premium than do unconstrained firms.⁷ An additional issue is that the paper measures a firm's degree of financial constraints using the correlation between investment and cash flow during the contraction phase of the recession instead of in normal times. The paper argues that firms that can still invest while their income is shrinking are likely to have good access to external funds, yet these may also be firms with higher initial levels of internal and working capital, higher costs of stopping current investment projects, or a greater ability to postpone payments to suppliers to obtain liquidity.⁸

The arguments presented above suggest that at least part of the increase in investment documented in the paper at the aggregate, sectoral, and firm levels could correspond to a cyclical phenomenon. Admittedly, the Chilean

6. Braun and Larraín (2005) estimate that in normal times, firms in a sector at the seventy-fifth percentile of external dependence grow 1.5 percent faster than firms in an industry at the twenty-fifth percentile. Assuming for a back-of-the-envelope calculation that capital share in Chile is about 0.5 (from Chumacero and Fuentes 2005), no depreciation, no total factor productivity growth, and a common increase in employment of 75 percent (the average for 1984–89), this estimate would be consistent with a relative increase in investment of about 3.4 percent. In Hsieh and Parker, investment in industries with a high external dependence is about 2 percent higher than in industries with a low external dependence during the recovery period (obtained considering an interquartile range of external dependence of about 0.6 and the average differential investment rate after 1984 of 3 percent).

7. Gertler and Gilchrist (1994); Kashyap, Lamont, and Stein (1994); Oliner and Rudebusch (1996); Sharpe (1994).

8. See Fazzari and Petersen (1993). Additional issues with the measure of financial constraints in the paper have to do with the fact that the correlations between investment and cash flow seem to be calculated using only three years of data and without using Tobin's *Q* to control for investment opportunities, as is standard in the literature. Also, another explanation for the paper's results is that the correlation between profits and investment may reflect differences in expectations across firms. Firms that expected a prolonged recession may have decided to adjust their desired levels of capital. If these pessimistic firms were forced to adjust their expectations and their desired levels of capital upward after the fact, it could reproduce the patterns documented in the paper.

investment boom persisted for almost a decade, which is beyond business cycle frequencies. Nevertheless, there are two important considerations associated with the cyclical issue. First, attributing the whole short-run expansion in investment to the reform would overestimate its overall impact even if the medium-run expansion were completely caused by it. Second, considering the possibility of cyclical effects leads me to reframe the question to ask why the boom persisted beyond 1986. While the 1984 tax reform is a possibility, some of the arguments used to disregard alternative explanations based on the specific timing of the reform and the investment boom do not apply well to this new question.

Final Remarks

Hsieh and Parker have written a very interesting paper. They address a difficult problem and present a compelling and thought-provoking argument in a clear, well-reasoned manner that should be given serious consideration. As I have discussed above, however, some remaining issues may affect the interpretation of the results, if not qualitatively, at least quantitatively. Although many of these issues cannot be properly addressed within the context of their paper, it is important for the reader to be aware of them before forming an opinion.

Another issue that arises from this discussion is the extent to which one can extrapolate the results from the Chilean experience to other countries. As mentioned above, Chile was unusual along several dimensions when the tax reform took place. The authors acknowledge this issue by qualifying their statements as applying to an economy with a sound macroeconomic environment, but this does not completely cover the particularities of the Chilean case. At least from a quantitative perspective, the authors must be careful in generating false expectations for countries willing to undertake these type of measure.

Finally, any assessment of the desirability of a reform like the one described here must take into account the potential costs associated with it. At least in the short run, a reduction in taxes will reduce government revenue, which may decrease government savings (thereby compensating the aggregate impact on investment), reduce social spending, or both. While the paper shows that this did not happen in Chile, one needs to be aware that the country was under a dictatorship during this period. Whether the same degree of fiscal austerity can result in a democratic environment is not guaranteed.

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