

# **SINGAPORE**

## **SELECTED ISSUES**



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November 2013

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Approved By  
**Rachel van Elkan**

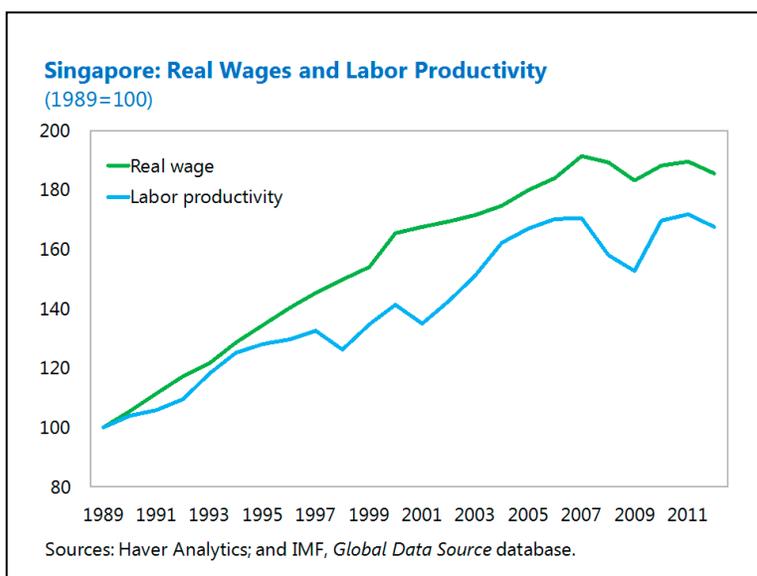
Prepared By Asia and Pacific Department

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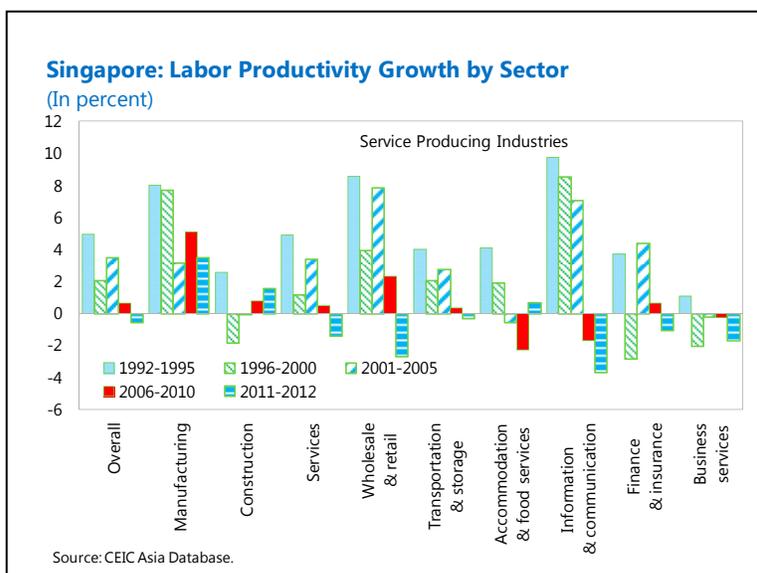
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## RESTRUCTURING TO RAISE PRODUCTIVITY<sup>1</sup>

**1. Successful implementation of Singapore's policies to reduce labor intensity hinges on raising productivity in tandem with wages.** In 2010, Singapore embarked on a program to raise economy-wide labor productivity by 2–3 percent per year over the next 10 years. In addition to measures incentivizing companies to upgrade technology and employees' skills and encourage workers to seek additional training, the authorities' strategy relies on reducing the dependence on foreign workers. The resulting tighter labor market conditions were anticipated to raise real wages and, in turn, support productivity growth by encouraging investments in physical and human capital. To protect long-term competitiveness, annual wage guidelines are set with the goal of keeping real wages in line with productivity over time. However, deviations have occurred in recent years as wage increases have preceded productivity gains, which typically take time to materialize.



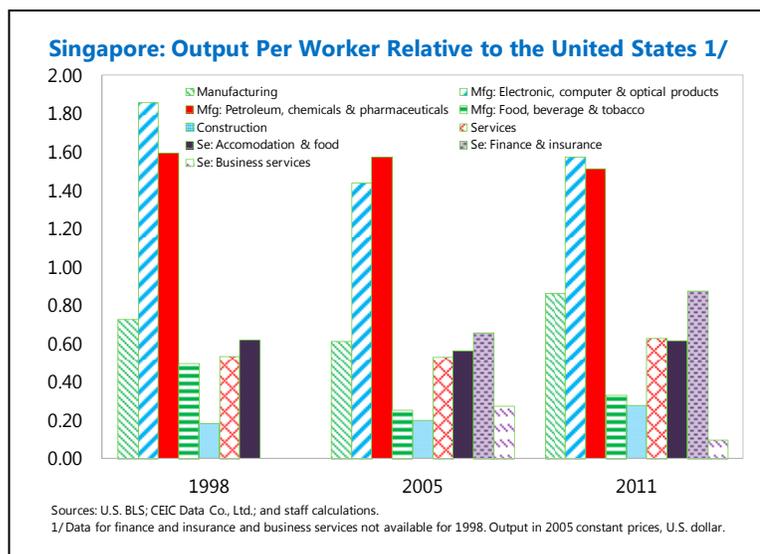
**2. Labor productivity growth in Singapore has slowed to 1.5 percent on average during 2000–2012, after peaking in the 1980s and 1990s, led by strong growth in manufacturing and financial services.** This decline has been broad based. In manufacturing, productivity growth slowed even in high-tech sectors that historically had seen large productivity gains.



<sup>1</sup> Prepared by Sanaa Nadeem and Elif Arbatli.

### 3. Sectoral comparisons with the United States suggest that scope for productivity catch up varies widely.

In some industries, such as computers and electronics and chemicals, current practices appear to be close to the technological frontier. On the other hand, large labor productivity gaps with the U.S. exist in construction, accommodation and food services, and business services, suggesting scope for catch-up in these areas.



### 4. Reducing labor dependence is essential to deal with Singapore's impending demographic shifts, yet it also carries risks.

In particular, excessively rapid wage growth unmatched by improving productivity could weaken demand and cause output to shrink. Two case studies where this has occurred offer insights on missteps to avoid:

- Singapore itself in the early-mid 1980s offers one example. Employer contributions to the Central Provident Fund (CPF) were raised from 16½ percent to 25 percent during 1978–1984, and gross wages increased by 12 percent during 1980–1985. The resulting increase in employment costs significantly outstripped productivity growth and, as a result, during 1980–84, unit labor costs rose by 38 percent and the real effective exchange rate appreciated by 14 percent on a cumulative basis. The loss in competitiveness was exacerbated by weak external conditions, precipitating a severe recession in 1985. To restore competitiveness, wage and CFP increases were subsequently reversed and the exchange rate was allowed to depreciate, allowing growth to quickly resume.
- Germany's reunification experience, although occurring under very different historical and structural contexts, offers another—albeit extreme—case of wage growth outstripping productivity growth. At market exchange rates, nominal wages in East Germany in 1989 were one third of their West German counterparts. The decision to convert the two currencies at parity therefore implied a sudden and very large increase in wage costs, with hourly wages jumping 20 percent between 1989:Q4 and 1991:Q2 in the eastern part of the country. Productivity significantly lagged the jump in wages, leading to a severe loss of competitiveness. By 1991, industrial production in the former East Germany had fallen by two thirds and the unemployment rate had increased to 20 percent. Moreover, these effects proved very persistent owing to the fact that many factors of production—both labor and capital—could not be profitably redeployed under the new wage structures.

- These episodes highlight the costs of excessively delinking wages from productivity and that permanently higher wages may create sustained dislocation for some businesses, sectors, and workers—with the latter, possibly falling along generational lines.

**5. The Singapore authorities have emphasized important differences between the current episode and the 1980s experience.** *First*, the increase in labor costs is consistent with the economy's underlying demographic trends, while the earlier cost increases did not reflect labor market fundamentals. *Second*, wage adjustments are expected to take place gradually, as evidenced by the experience of the past four years. This reflects a calibrated approach to tightening foreign worker policies to facilitate a gradual substitution toward other factors of production, taking account of labor market conditions. *Third*, firms have received significant advance notice of policy changes and been provided temporary government financial assistance—including a Wage Credit Scheme—to encourage forward planning and the sharing of productivity gains with workers. And *fourth*, a multi-pronged approach has been adopted to foster productivity growth through technological enhancements and skills upgrading. All told, these considerations increase prospects—but do not assure—that the restructuring process will deliver faster productivity growth without significantly compromising economy-wide competitiveness, although certain segments may nonetheless be adversely impacted.

## SOME OBSERVATIONS ON SINGAPORE'S MONETARY POLICY FRAMEWORK<sup>2</sup>

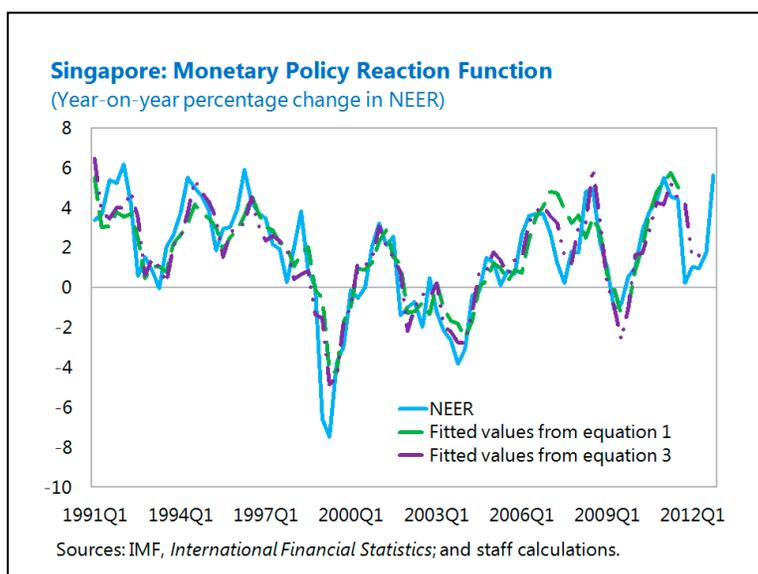
**6. Singapore's monetary policy uses the nominal effective exchange rate (NEER) as the instrument in a basket-band-crawl framework.** This box explores two aspects of this framework: (i) what determines monetary policy decisions, which have successfully yielded low, stable inflation for some 30 years; and (ii) how is this framework conducive to export-led growth.

### A. Monetary Policy Reaction Function

**7. A Taylor rule provides a simple reduced-form formula summarizing the unobserved complex forecasting models central banks use to inform their policy decisions.** Taylor rules are typically estimated on historical data, which differs from the real-time data central banks rely on and that may be subsequently revised. As such, Taylor rules provide only an approximation of actual decision making, where the preferred Taylor rule is chosen based on standard model selection criteria.

<sup>2</sup> Prepared by Niamh Sheridan and Sanaa Nadeem.

**8. Previous empirical research on Singapore’s monetary policy framework has adapted the Taylor rule approach by replacing the standard short-term policy interest rate instrument with the percentage change in the NEER.<sup>3</sup>** The literature for Singapore concludes that policymakers adjust the pace of nominal appreciation/depreciation in response to expected deviations of inflation from its desired level and output from potential. Estimates from a similar model, (equation 1 in the text table), confirm the significance of both gaps for policy decisions, and model fit of the actual NEER path is quite good. Similar results are obtained when headline inflation is replaced by core inflation.



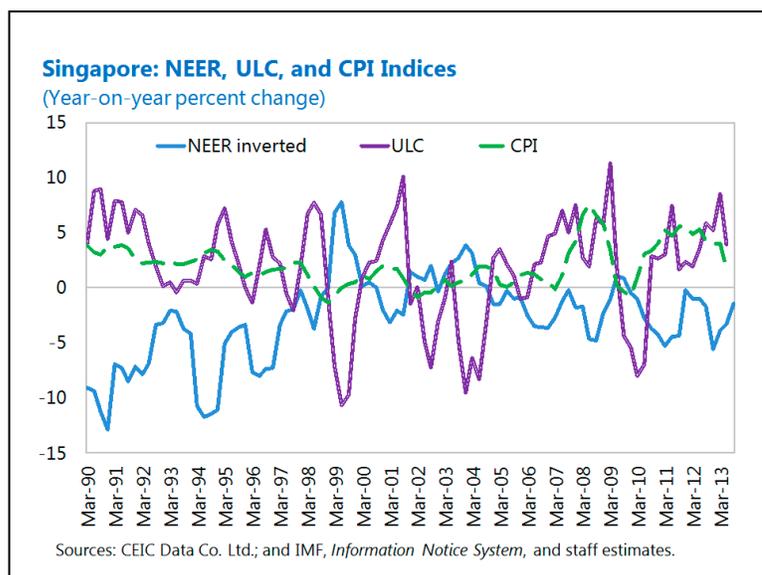
**Singapore: Monetary Policy Reaction Function, 1991:Q1-2012:Q4 1/**

	Constant	Lagged Change in NEER	Inflation	Output Gap	Percent Change ULC	Percent Change US\$ Import Prices	R <sup>2</sup>	SE
Equation 1 4 quarter ahead inflation	0.48 (0.54)	0.57 (0.05) **	0.69 (0.25) **	0.73 (0.16) **			0.66	1.63
Equation 2 4 quarter ahead inflation; 2 quarter ahead percent change in ULC	0.40 (0.67)	0.61 (0.05) **	0.19 (0.31)	-0.30 (0.28)	0.74 (0.21) **		0.72	1.48
Equation 3 2 quarter ahead percent change in ULC	0.77 (0.45)	0.64 (0.06) **			0.63 (0.17) **		0.73	1.42
Equation 4 2 quarter ahead percent change in ULC	0.76 (0.57)	0.68 (0.06) **			0.47 (0.23) *	0.18 (0.18)	0.72	1.45

1/ Dependent variable is the change in the NEER. The contemporaneous output gap is used in the regressions. Estimated using GMM using lagged variables as instruments. Standard errors are in parentheses; \* indicates significance at 5 percent; \*\* indicates significance at 1 percent.

<sup>3</sup> See McCallum, B.T., 2006, “Singapore’s Exchange Rate Centered Monetary Policy Regime and Its Relevance for China,” MAS Staff Paper No. 43 (Singapore: Monetary Authority of Singapore); Parrado, E., 2010, “Singapore’s Unique Monetary Policy: How Does It Work?,” IMF Working Paper No. 04/10; and MAS’s Macroeconomic Review, April 2013. Note that this previous work, and this SIP, use the actual change in the NEER, which is a combination of MAS’s policy decisions regarding the BBC parameters, monetary policy decisions in other countries, and the behavior of exchange market participants.

**9. However, once nominal unit labor costs (ULCs) are added to this Singapore-style monetary policy reaction function, both inflation and output gaps lose their significance** (see equation 2). This is not surprising, given the close negative relationship observed between growth in ULCs and in the NEER. Re-estimating the reaction function with only ULC growth yields equation 3, which fits the data well. In fact, based on goodness of fit, the ULC-only model and the inflation and output gap model are observationally similar, with the ULC model providing a somewhat smaller standard error of the regression.<sup>4</sup> Several other considerations also tend to favor the ULC-only Taylor approximation: (i) by “Occam’s razor,” a simpler model is preferable; (ii) because inflation was very stable until 2008, it is unlikely to have accounted for much of the variability in the NEER (and the higher volatility since then reflects real estate and transport prices, rather than general macroeconomic conditions); and (iii) frequent large backward revisions to GDP suggest that real-time GDP data may provide a poor basis for estimating the current output gap. The ULC-only Taylor rule is consistent with using monetary policy to influence inflation through two channels: (i) strengthening the nominal exchange rate to reduce demand for domestic factors of production—mainly labor—and hence dampen wage costs; and (ii) offsetting domestic cost pressures through exchange rate changes to lower local currency import prices.<sup>5</sup>



## B. Managing the REER

**10. Consistent with this observed ULC-only monetary policy reaction function, rising ULCs trigger a persistent nominal appreciation.**<sup>6</sup> However, if the trend rise in the NEER leads to a

<sup>4</sup> Import prices (in U.S. dollar) are not found to be statistically significant (equation 4).

<sup>5</sup> Based on historical data, these two policy rules would have very frequently guided policy in the same direction, however, this may not always be the case. Consider a scenario where an increase in foreign worker levies pushes up ULCs while at the same time the output gap is negative; the ULC-only rule would suggest policy tightening, whereas the guidance from an output-inflation rule would depend on the relative weights assigned to these variables in the rule.

<sup>6</sup> This would also be the case in the alternative inflation gap-output gap Taylor rule, where wage pressures feed through to prices and hence call for an increase in the pace of NEER appreciation.

corresponding increase in the REER, this could hurt competitiveness, which is antithetical to Singapore's export-led growth model.

**11. However, if imports have a large weight in consumption and/or production, nominal appreciation can lower relative inflation, thereby dampening the rise in the REER.** This can be seen by noting that the pace of real appreciation depends on the NEER path and the inflation differential between Singapore and its trading partners. An increase in the NEER raises the REER directly, but lowers it indirectly by decreasing the local currency prices of imported intermediate and consumption goods.

### A Stylized Example

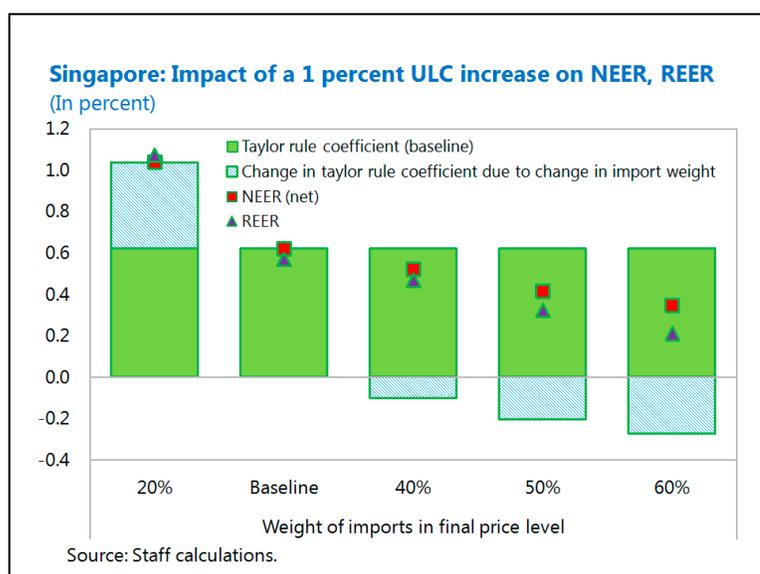
**12. To see how this monetary policy framework can support competitiveness, consider the effect of a 1 percentage point increase in ULCs.** Implicit in the monetary policy reaction function given by the estimated Taylor rule (TR) in the previous section is the actual weight of imports in the consumption basket (thought to be around 37 percent).

#### (a) Effect on the NEER

- In this base case, applying the estimated TR implies raising the NEER by about 0.6 percent (shown by the green bar in the chart). If the weight of imports is larger than in the base case, the amount of NEER adjustment to keep prices steady would be smaller (shown by the increasingly negative blue shaded bars as import weights rise). Similarly, a smaller import weight than in the baseline requires a larger increase in the NEER. Hence, for a given increase in ULCs, the TR's NEER response is diminishing in the import share (shown by the red squares, which are the sum of the green and blue bars).

#### (b) Effect on Relative Prices

- The effect on the REER (shown by the purple triangles) is the sum of effects on the NEER and the price level relative to trading partners. The price level effect is comprised of the impact from domestic price pressures (ULCs)—which is positive—and the import component, which depends on the NEER and, in turn, ULCs through the TR—which is negative. Thus, the effect of ULCs on the price level—including the monetary policy reaction—is ambiguous. However, for sufficiently large import weights, the decline in imported inflation dominates the rise in domestic inflation.

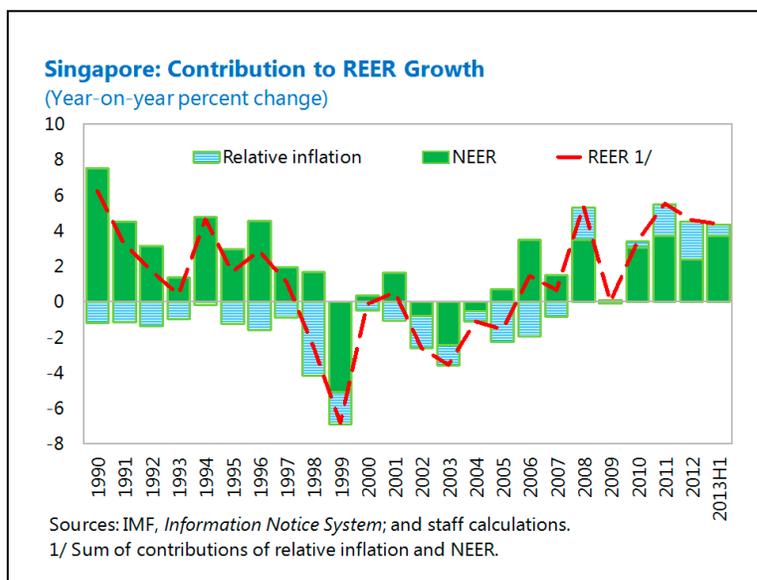


(c) *Effect on the REER*

- In all, when the weight of imports rises, the increase in the REER will be smaller than the TR-implied increase in the NEER, which itself is declining in the import weight. As a result, using an exchange rate-based monetary policy to address domestic price pressures may not impede competitiveness provided the import share is sufficiently large.

## C. Implications

**13. The MAS's monetary policy framework has tended to work well in containing the increase in Singapore's CPI-based REER, despite rising ULCs.** As can be seen from the chart, the contribution of Singapore's inflation differential to REER appreciation was consistently negative prior to 2008, dampening the contribution from the rising NEER. More recently, however, when housing and transport costs became a major source of domestic price pressures, these were addressed through macroprudential measures (MaPs). Owing to delays in effectiveness of the MaPs, relative inflation and NEER appreciation both contributed positively to REER appreciation during 2010–13:H1.

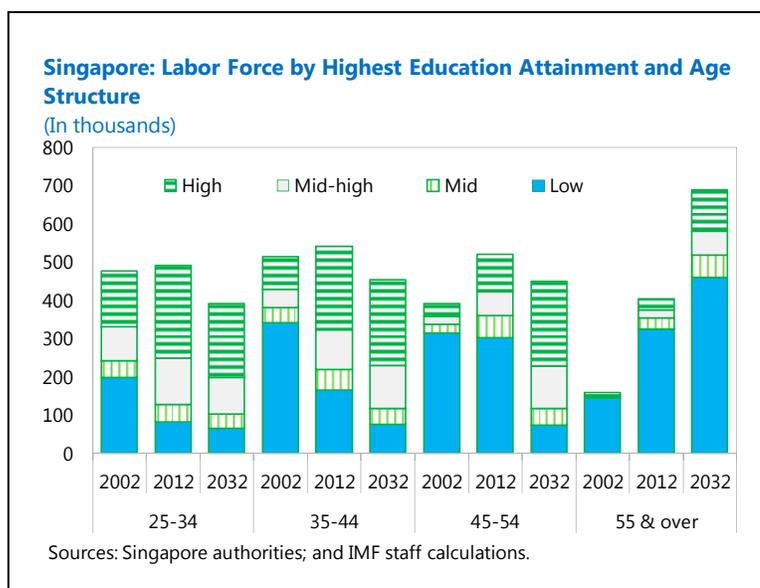
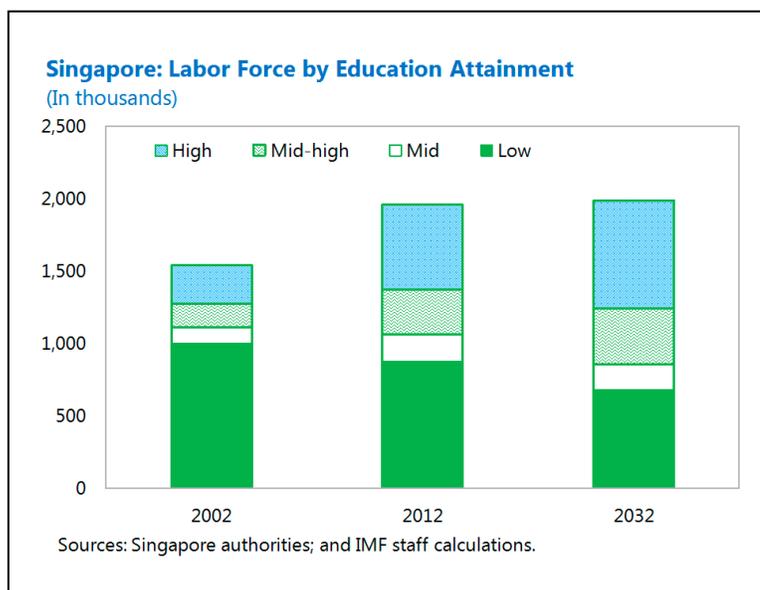


**14. This note finds that under some conditions an exchange rate-based monetary policy may not be detrimental to external competitiveness.** A key parameter is the weight of imports in the consumer basket or production function. Tightening monetary policy through a nominal appreciation helps to dampen *imported* cost pressures. In addition, nominal appreciation can reduce *domestic* sources of inflation by lowering demand for local factors of production. A ULC-only Taylor rule is found to approximate movements in the NEER well.

## SINGAPORE'S EDUCATION-AUGMENTED LABOR SUPPLY<sup>7</sup>

15. Singapore's resident labor force (RLF) is undergoing significant changes that will have important implications for future growth dynamics:<sup>8</sup>

- The size of the RLF grew significantly between 2002 and 2012, but is expected to remain unchanged by 2032;
- The RLF is projected to continue to age rapidly. The number of residents in the 25–34 age group is forecast to drop by nearly 20 percent by 2032. On the other hand, the number of workers 55 and older will rise by one-third by 2032.
- The educational attainment of the RLF increased markedly during 2002 and 2012. This reflects the fact that younger cohorts have significantly higher education levels than their older counterparts. While in 2002, only 18 percent of the resident labor force had graduated from university, this share had risen to 26 percent in 2012. Based on the assumption that future



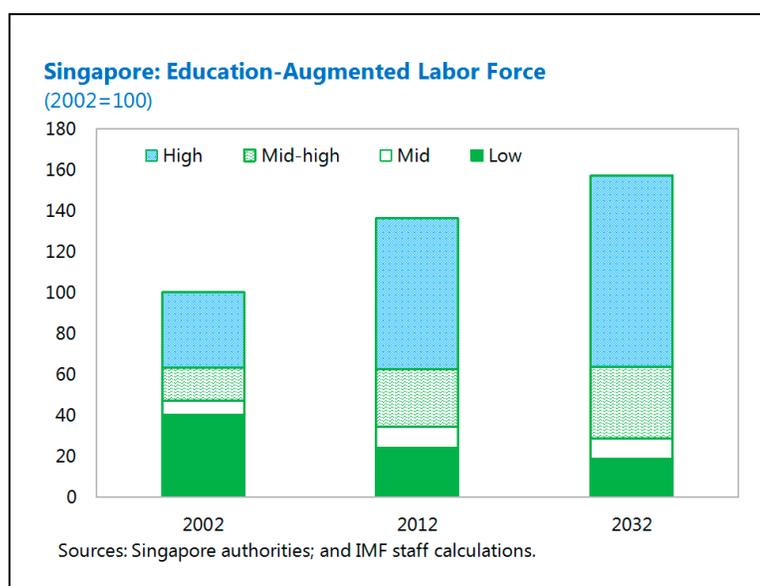
<sup>7</sup> Prepared by Sanaa Nadeem and Janice Lee.

<sup>8</sup> The resident labor force is based on the resident population aged 25 and older, adjusted by labor force participation rates for each age cohort. Staff projections for 2032 are based on the age distribution of the resident population in 2012, and assuming an average labor force participation rate of 40 percent for workers aged 55 and older, as observed in 2012.

labor force entrants will have the same education mix as 25–34 year olds in 2012, by 2032 more than 60 percent of the resident labor force will have had a tertiary education.

**16. Can concerns about a constant or even shrinking resident labor supply be assuaged by the rising education levels of younger workers?**

One approach is to calculate an “education-augmented” labor supply, where better-educated workers are assigned a larger weight than their less well-educated counterparts, and see how it evolves over time. An objective weighting scheme is to use the market-determined real wage applicable to each skill group. With this weighting system, the share of better (less-well) educated workers in the effective labor force is magnified (compressed) relative to its unweighted share.<sup>9</sup>



**17. Applying this approach yields the result that the effective labor supply grew considerably more rapidly during 2002–12 than the number of “raw” workers.** Moreover, the education-augmented labor supply is projected to expand strongly between 2012 and 2032, despite the broadly unchanged raw number of workers. This education dividend can mitigate concerns about the impact of future demographic decline, provided the types of jobs available adapt to the changing skill set of the labor force.

<sup>9</sup> Actual real wages for each skill group are used for 2002 and 2012. For 2032, real wages as of 2012 are used.