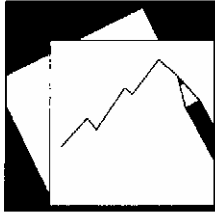


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Mauritius: Unemployment and the Role of Institutions

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IMF Working Paper

African Department

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Abstract

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Despite strong economic growth, a "U"-curve unemployment phenomenon in Mauritius can be observed. Unemployment plunged from 21 percent to less than 4 percent between the early 1980s and the early 1990s, but this trend was reversed and the rate increased to 10 percent by end-2002. This paper provides an analytical framework to explain this development. The growth of higher-skilled sectors coupled with rigidities in the labor market seem to account for the observed unemployment behavior. Policy makers can improve employment prospects by not only investing in education to reduce skills mismatch but also by reforming the pay-setting institutions.

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I. INTRODUCTION

The Mauritian economy has experienced profound structural changes during the last two decades. The rapid development of manufacturing in the 1980s led to job creation, largely through the growth of export processing zone (EPZ) enterprises.² Since the early 1990s, the financial services and tourism industries have emerged as new growth sectors, requiring higher-skilled workers. The demand for high-skilled workers is expected to strengthen further in coming years as the government moves forward to actively promote the development of an information communications technology sector and free port activities.

Despite strong economic growth, averaging just below 6 percent per year over the last two decades, a “U”-curve phenomenon of Mauritian unemployment can be observed (Figure 1). The unemployment rate plunged from about 21 percent to less than 4 percent from the early 1980s to the early 1990s. Notwithstanding sustained economic growth averaging 5½ percent per annum between 1991 and 2002, the declining trend in unemployment was reversed, and the rate steadily increased, reaching approximately 10 percent by end-2002. According to the 2000 census, a majority of the unemployed were young, had never held a job, had failed primary or secondary school education, had no technical or vocational training, and were single and family supported. Despite the rising unemployment rate, two paradoxical facts about the 1990s can be noted: (1) the EPZ was crippled by labor shortages, and was compelled to import foreign workers, mainly from China; and (2) the number of unfilled skilled-job vacancies, especially in the financial service sector, increased over the decade.³ These phenomena constitute a so-called Mauritian unemployment puzzle.

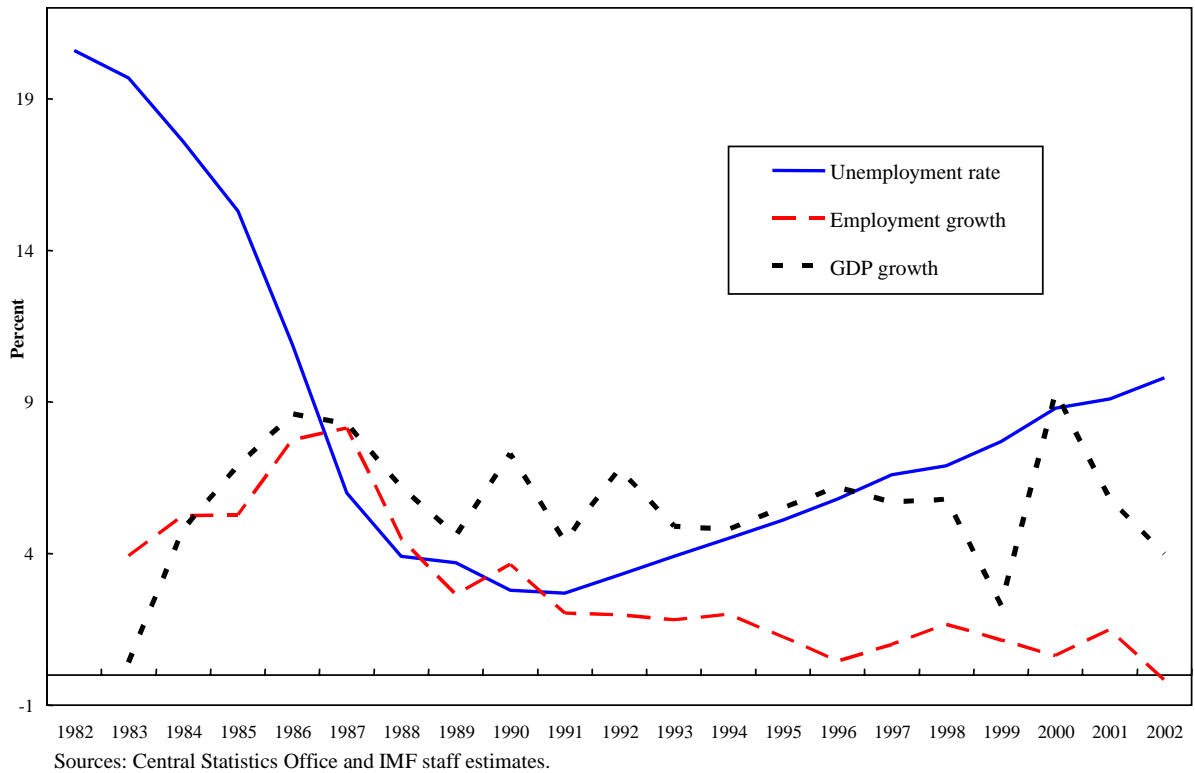
There is little consensus in Mauritius as to the exact nature and causes of the unemployment problem.⁴ In addition, there is a lack of analysis of the possible linkages between labor market institutions and unemployment. While it is easy to blame “labor market rigidities” for the problem, a more rigorous analytical framework of the role of labor market institutions

² The majority of enterprises in the EPZ are textile firms.

³ In its 2002 report, the Bank of Mauritius states that “while vacancies advertised have been principally for skilled and management jobs, the vast majority of persons seeking jobs do not have the necessary training, reflecting the mismatch between available labor and skills required.”

⁴ Mauritian unemployment figures are derived from incomplete data, reflecting in the main, conditions in “large establishments.” The Mauritian Central Statistics Office is of the view that there is a tendency for people to falsely declare themselves as unemployed. The false responses to questions regarding employment and income might be explained by the respondents’ hopes of receiving some current or potential unemployment benefit. In the case of people engaged in the informal sector, they may not wish to acknowledge their employment and income, because of fear that the questionnaire may be used for tax collection purposes. This view is shared by some policymakers (see Coe and others, 2002).

Figure 1. Mauritius: Real GDP Growth, Employment Growth, and Unemployment Rate, 1982-2002



would be useful to facilitate dialogue among Mauritian social partners. Therefore, the purposes of this paper are twofold. The first is to outline a simple analytical model to explain the unemployment puzzle, especially the U-curve phenomenon. The second is to identify the central institutional imperfections that characterize the existing Mauritian labor market and suggest possible reforms. The model developed in this paper has its roots in the literature on technological revolutions and wage and income inequality. In the next section, we survey this literature. Section III then describes Mauritian labor market institutions and some observations about the education system. Section IV presents the analytical model, and Section V provides concluding remarks and policy recommendations.

II. LITERATURE SURVEY

Starting in the early 1970s, income and wage inequality has been rising in the United States. To explain this phenomenon, there has been a growing recognition of the significant role of skill-biased technical change. The information technology revolution has been the prime candidate accounting for this technical change. The original papers in the skill-biased technical change literature, such as Katz and Murphy (1992) and Juhn, Murphy, and Pierce (1993), are based on a simple model of technological revolutions. Skill-biased technical change should increase the relative demand for skilled labor, which should lead to higher relative wages. If labor supply curves for the different kinds of labor are upward sloping, then the employment of

skilled labor, relative to unskilled labor, will rise. However, the simple labor demand-and-supply model fails to provide a detailed mechanism to explain the wage inequality or skill premium.

Caselli's (1999) paper focuses on the impact of technological revolutions. A technology is defined as a combination of capital of a certain type and workers who have the corresponding skills. A technological revolution is the introduction of new types of machines. The productivity of new capital is higher than preexisting capital, but workers who have developed a set of capital-specific skills can only be suitable for that capital. The acquisition of new skills that are appropriate for the emerging technology is costly, and the labor force is heterogeneous in the cost of learning these skills. The wage gap (or skill premium) between workers with the traditional capital and workers with the new capital becomes increasingly large. Workers with low learning costs start using the new capital as the skill premium is greater than their learning cost, while high-learning-cost individuals remain attached to the traditional capital with less advanced technology. Given an assumption of constant saving, new investment diverges from workers in low-skilled capital industries and toward those in the high-skilled capital sectors. With a lower capital-labor ratio, high-learning-cost workers could experience an absolute decline in their wages. This is the so-called working poor phenomenon. Low-learning-cost workers, because they work with new capital with more advanced technology, and because they subsequently have a higher capital-labor ratio, see their wages rise. Wage inequality therefore increases during the introduction stage of the technology revolution.

Caselli (1999) discusses the further evolution of the skill premium, after the initial phase of the technology revolution. An ever-widening skill premium and limited learning cost will draw an increasing number of workers in each generation into the skilled capital sector, thereby reducing wage inequality after at least one generation. Nevertheless, decreasing marginal returns to capital accumulation may lead the economy toward a steady state in which the labor market remains split between skilled workers with high wages and unskilled workers with low wages.

Caselli's (1999) model, however, abstracts from unemployment and focuses mainly on wage movements. Although these models can provide an explanation for an increase in skill premium and wage inequality in the United States since the early 1970s, they do not offer a unifying explanation for higher unemployment in continental Europe during the same period. It is likely that continental Europe has experienced the same technological revolution since the early 1970s; however, the consequence has been rising structural unemployment, rather than increasing wage inequality.⁵ In addition, models like that of Caselli (1999) abstract from any labor market institution and education system that might constrain the response of wages or

⁵ Under skill-neutral technical changes, higher unemployment may be primarily a short-term phenomenon because the main issue is the reallocation of labor from contracting to expanding sectors rather than skill mismatch.

employment to clear the labor market under skill-biased technology changes. For example, a flexible labor market institution can allow a substantial differential between the wages of skilled and unskilled workers (referred to here as the “skill premium”).

The importance of labor market institutions for growth has increasingly been recognized (see IMF, 2003). The major innovation of the simple model we present below is to introduce the role of labor market institutions into Caselli’s basic framework. In particular, a centralized wage-bargaining system can limit the development of the skill premium, resulting in two negative consequences: (1) the wages of unskilled workers would grow faster and destroy the job opportunities in the traditional unskilled sector; and (2) the supply of skilled workers would be inadequate, given the learning and education costs. As the wages in the traditional unskilled sector go up, the job losses may not be sufficiently offset by the job creation in the high-skilled new sector. Therefore, the overall unemployment rate is likely to rise, at least at the beginning of the period of structural and technological change.

Based on this simple analytical framework, we argue that rising unemployment is largely structural in nature, spurred on by the skill-biased technological changes taking place in the economy and the centralized wage-bargaining system. We consider that the Mauritian authorities’ current educational reforms are important in increasing the labor supply of skilled workers and reducing the mismatch between labor demand and skill availability. The authorities should also address the rigidities on the labor demand side through revision of wage-setting institutions and laws. Overall, we believe that both the supply-side and demand-side reforms will increase labor market flexibility, reduce the unemployment rate, and help sustain growth at the relatively high levels Mauritius has enjoyed during the past two decades.

III. MAURITIAN LABOR MARKET INSTITUTIONS AND EDUCATION SYSTEM

Key wage-determining institutions at the national level are the Tripartite Committee, the National Remuneration Board (NRB), and the Pay Research Bureau (PRB). The Tripartite Committee is responsible for the determination of wages at the national level through consultations involving the government, trade unions, and representatives of the private sector. These wage agreements of the Tripartite Committee are legally binding on the economy. The NRB sets minimum wages by worker category for 29 sectors in the private sector. There are more than 400 of these minimum wages, and changes to them are not made uniformly (some of them are a decade old). Also, the NRB stipulates the conditions of work associated with specific pay levels. The PRB makes recommendations regarding salaries in the public sector. Pay disputes can be referred to two arbitration tribunals—the Permanent Arbitration Tribunal for the private sector, and the Civil Service Arbitration Tribunal for the public sector. These tribunals typically hand down awards that take little account of productivity levels or the need to safeguard external competitiveness.

The determination of wages by the centralized bargaining system discourages sector-specific competitive wage setting, resulting in a strong relationship between the wages of the traditional sectors and those of the emerging sectors. While the new sectors create demand for skilled workers and, thus, increase the wages in these sectors, wage increases typically follow in

the traditional sectors, leading to a loose relationship between wages and productivity in the traditional sectors. The trend rise of wages in the traditional sectors reduces domestic demand for unskilled workers and tends to increase the unemployment rate of these workers. From the labor supply side, skill premium, expressed by the wage differential between the two sectors, is constrained by this stable relationship, resulting in fewer incentives for the young to invest in education, and to supply skilled labor for the new sectors.

There is segmentation between the domestic and foreign labor force in the EPZ in that legal minimum wages are not applied to foreign contract workers.⁶ Therefore, wage increases for domestic EPZ workers do not necessarily lead to increases in the wages of foreign EPZ workers. In addition, employers have greater flexibility in discharging foreign workers in the EPZ. For example, no severance allowances have to be paid before retrenching foreign workers, and advance notification of retrenchment to the statutory body (Termination of Contract of Services Board) is not required.

Even though working conditions in the EPZ are better for domestic workers than foreign workers, there is an observed unwillingness of the former to offer their services in the EPZ. This is because domestic job seekers consider EPZ employment unattractive on account of its low pay and high insecurity, as compared with employment in the rest of the economy.⁷

The education system plays a key role in supplying skilled labor. Although Mauritius has a comparatively high level of literacy, it is weak in secondary and technical education, especially in natural sciences, engineering, and vocational subjects. A large proportion of the young are unable to access secondary education because of the very competitive system for moving from primary to secondary schools, and thus cannot supply the needed skilled labor. Currently, almost 35 percent of students fail to pass the completion-of-primary-education examination and drop out of the school system at the age of 12 or 13. This high failure rate is partly indicative of the inadequate availability of secondary educational facilities. The cost of acquiring secondary education is much higher than it would be with greater access.

⁶ The foreign workers are predominantly contract workers from China. Mostly women, these workers typically come to Mauritius on three-year contracts, with backgrounds that include three years of vocational training and a few years of work experience in the textile industry.

⁷ The Survey on the “Attitudes of the Unemployed Towards Accepting Employment in the Export Processing Zone of Mauritius” (Center for Applied Social Research, 2001) finds that wages and working conditions are unanimously agreed to be “bad” in EPZ enterprises. Long working hours, poor remuneration, limited career prospects, job insecurity, and the risk of not receiving severance pay in the event of job loss are listed as the most unattractive features of these jobs.

The consequence of the labor market institutions and the nature of the education system is that skilled-labor demand in the emerging sectors is largely unmet by the skilled-labor supply—a situation that has a dampening impact on labor demand growth. In summary, the relative equality of wages in the traditional and emerging sectors plus the high cost of access to secondary education leads to low-skilled labor supply thus limiting the growth in the emerging sector and less growth in economy-wide labor demand.

IV. AN ANALYTICAL MODEL

Assume an economy has two development stages. In the first stage, the economy has only one traditional sector. The traditional sector is low skilled. At a certain time, there is a significant technological change, driven by substitution between types of capital that differ in the set of skills required of the workers who use them. After the technological change, a new sector emerges that requires high-skilled labor. In Mauritius, we assume the traditional sector to consist of sugar and textiles, while the emerging sector is represented by financial services and high-end tourism. In our framework, we consider these two activities to be “high-skilled” because they require more advanced educational training (that is, at least secondary) than the traditional sector and are less labor intensive.

Following Caselli (1999), we use a simple overlapping-generations framework to describe demographics. Each generation of workers lives for two periods and is composed of a continuum of agents with aggregate measure 1. Suppose individual workers are heterogeneous in terms of their ability to acquire education. In the first period, individual workers can decide whether they want to acquire higher education and work or not, while in the second period, they retire and consume their savings. Workers are endowed with one unit of unskilled labor, which they can supply inelastically to the traditional sector. Individuals can choose to become skilled workers by acquiring higher education at a cost $c + \sigma(I)$, where c is the fixed educational cost and $\sigma(I)$ the learning costs. As mentioned above, c is higher mainly because of the low level of access to secondary education. The individual learning-cost distribution of $\sigma(i)$ is uniform on $(0, \sigma)$. While domestic labor markets for the traditional sector and the new technology sector are perfectly competitive, there is no labor reallocation from the traditional sector to the new sector.⁸ In addition, the capital market is not perfectly competitive so that there are interest rate differentials across the two sectors and one sector can enjoy all the investment. There is no capital depreciation.

⁸ In their cross-country study, Dowrick and Gemmell (1991) find that the speed of labor transfer from traditional to modern sectors has been slow in less-developed countries.

A. Unemployment in the Traditional Sector Before Technological Change

The aggregate production function of sector 1 can be expressed as the following:

$$Y_1(t) = (K_t^1)^\alpha (L_t^1)^{1-\alpha}, \quad (1)$$

where $Y_1(t)$, K_t^1 and L_t^1 are output, capital stock, and the unskilled labor force of sector 1 at time t , respectively. Labor demand in sector 1 is

$$L_t^1 = (1 - \alpha)^{\frac{1}{\alpha}} (w_t^1)^{-\frac{1}{\alpha}} K_t^1. \quad (2)$$

The labor market in sector 1 is segmented between domestic workers and foreign workers, whereby foreign workers are assumed to be mainly from low-income countries. Hence, the foreign labor supply in sector 1 is elastic, which means that foreign workers can fill the shortage of the domestic labor force. However, the wage of foreign workers in sector 1 is the same as that of the international wage level, $w_1^f = \bar{w}_1$. The wage of domestic workers is determined by a central bargaining system at the national level, in which sector 1 is the only sector. The wage of domestic workers is competitive but higher than that of foreign workers. Hence, $w_{1,t}^d = \bar{w}_1 + f$, where w_1^d is the domestic wage in sector 1 and f is the additional benefit the domestic workers enjoy. Given the capital stock K_t^1 , domestic employment in sector 1 is

$$L_t^1 = (1 - \alpha)^{\frac{1}{\alpha}} (\bar{w}_1 + f)^{-\frac{1}{\alpha}} K_t^1. \quad (3)$$

Unemployment during the pre-structural-change period is the following:

$$U_t = 1 - L_t^1. \quad (4)$$

As the capital stock in sector 1 increases, the unemployment of the economy declines because sector 1 absorbs more surplus labor in the economy. The foreign labor force fills the labor demand gap generated by the higher domestic wage relative to the international wage:

$$M_t^1 = (1 - \alpha)^{\frac{1}{\alpha}} K_t^1 \left[(\bar{w}_1)^{-\frac{1}{\alpha}} - (\bar{w}_1 + f)^{-\frac{1}{\alpha}} \right], \quad (5)$$

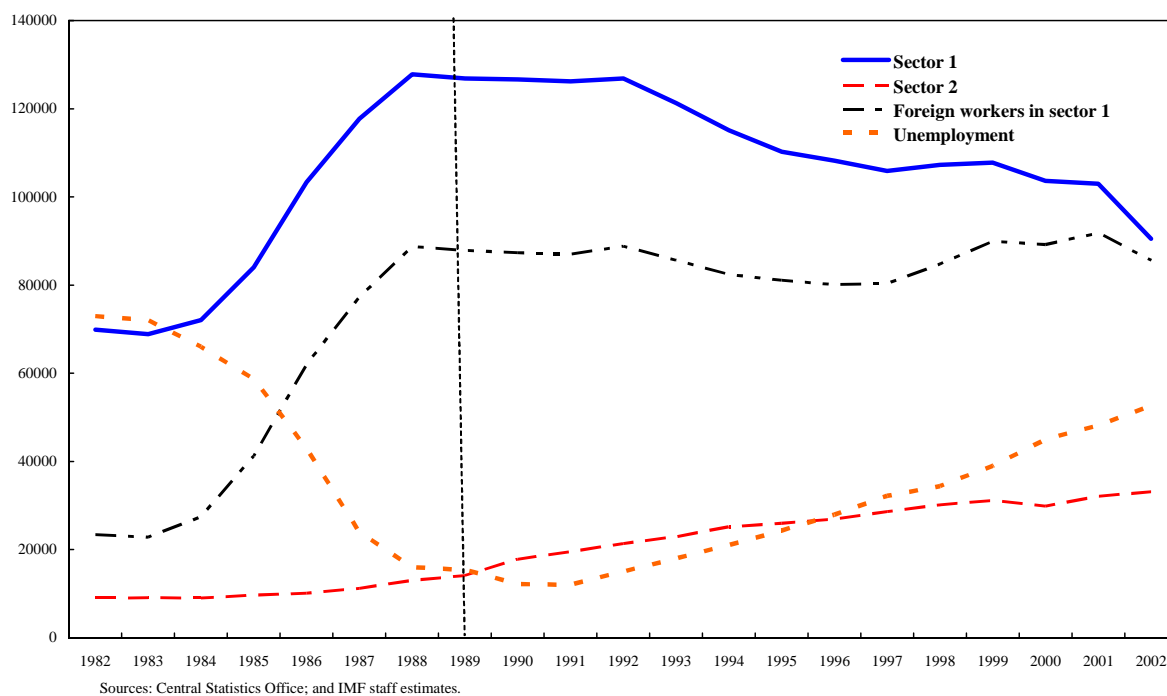
where M_t^1 is the foreign labor force in sector 1.

The predictions above broadly match the Mauritian employment experience in the 1980s. During the 1980s, the two traditional pillars of the economy (the sugar and textile sectors) were able to create sufficient job opportunities for the unskilled labor force, and,

therefore, the unemployment rate declined. At the same time, there was an inflow of foreign workers to these two traditional sectors, especially in the EPZ. As shown in Figure 2, domestic and foreign employment in sector 1 increased sharply during the 1980s, and correspondingly, the national unemployment rate declined substantially during the same period.

Figure 2. Mauritius: Domestic Employment of Sectors 1 and 2, Foreign Employment of Sector 1, and Total Unemployment, 1982-2002

(In number of workers)



If there were no structural or technological changes, this economy would converge to the standard steady state of the Solow (1956) neoclassical economy. Let an overline denote the value of a variable in the steady state of the one-sector economy. For T large enough, the economy will find itself in the neighborhood of this steady state when the structural change occurs. Hence, there is no loss of generality in assuming $K_t^1 = \overline{K}^1$ and

$$\overline{L}_1 = (1 - \alpha)^{\frac{1}{\alpha}} (\overline{w}_1 + f)^{-\frac{1}{\alpha}} \overline{K}_1, \quad (6)$$

where \overline{L}_1 is the maximum domestic labor force sector 1 can employ.

B. Development of a New Technology Sector

At time T , a sufficiently large injection of technology capital occurs, and a new technology sector, sector 2, is developed.⁹ Given an imperfect capital market, a skill-biased technical change would induce investment to immediately move from the traditional sector toward the new technology sector, thereby preventing the capital-unskilled labor ratio in sector 1 from further increasing. Subsequently, a complete switch of investment from low-cost to high-cost skill-learning workers reduces the relative wages of the former. As a result, sector 1's demand for unskilled labor will remain constant, and, given that the supply of foreign labor in sector 1 is perfectly elastic, the employment levels of unskilled labor will remain constant as well. Suppose the aggregate production function of sector 2 can be expressed as

$$Y_2 = A(K_t^2)^\alpha (L_t^2)^{1-\alpha}, \quad (7)$$

where $A > 1$ is an exogenous parameter, and K_t^2 and L_t^2 are new technology capital stock and skilled labor force, respectively. The specification in equation (7) captures the progressive nature of the new technology, which says that the newly introduced skill-type, capital-type pair is more productive than the old technology used in sector 1, for given quantities of inputs. The wage of sector 2 is

$$w_t^2 = (1 - \alpha)A(K_t^2)^\alpha (L_t^2)^{1-\alpha}. \quad (8)$$

The ratio of the wages of sector 2 to sector 1 is given by

$$\frac{w_t^2}{w_1} = A \left(\frac{K_t^2 / L_t^2}{K_1 / L_1} \right)^\alpha \geq 1.$$

This equation means that a rising capital-skilled labor ratio, K_t^2 / L_t^2 , raises the wage in sector 2. One major channel of influence between the traditional sector and the technology sector is the central wage-bargaining system, which creates an institutionally formed relationship between the average wage in sector 1, $w_{1,t}^d$, and the average wage in sector 2.¹⁰ Thus, sector 1's wage is no longer linked to the marginal productivity of labor in that sector. To

⁹ The injection of the technology capital can be done by government capital expenditure or foreign direct investment. Two new pillars (the financial services and high-end tourism sectors) were developed during the 1990s in Mauritius, reflecting to a large extent deliberate government industrial policy. These new pillars were largely financed through a redirection of domestic savings that were accumulated in the traditional sectors. The government supported the new pillars by providing their basic infrastructure and incentives to investors.

¹⁰ w_t^m can also be thought of as the workers' reservation wage. This partially explains the observed unwillingness of some workers in Mauritius to offer their services in the textile sector.

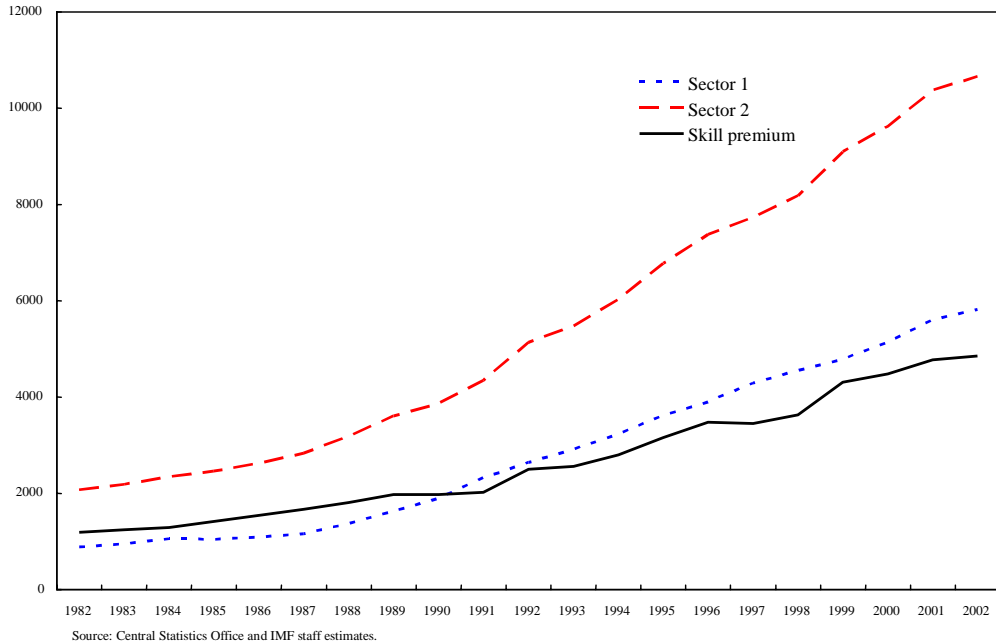
keep the story simple, we would like to ensure that $w_{1,t}^d$ rises and falls with the technology sector wage, w_t^2 , given that the wage of foreign workers in sector 1, w_1 , is constant. Hence, we get

$$w_{1,t}^d = \lambda w_t^2, \quad (9)$$

where λ is an exogenous parameter. Figure 3 shows that the wage of sector 1 does rise with the wage of sector 2 in Mauritius. However, the skill premium, defined as the wage differential between the two sectors, increases over time.

Figure 3. Mauritius: Average Wages and Skill Premium of Sectors 1 and 2, 1982-2002

(In Mauritian rupees)



Skilled-labor demand in sector 2 can be expressed as the following:

$$L_t^2 = A^{\frac{1}{\alpha}} (1 - \alpha)^{\frac{1}{\alpha}} (w_t^2)^{-\frac{1}{\alpha}} K_t^2. \quad (10)$$

However, the skilled-labor supply of sector 2 is determined by two factors: the wage differential between the two sectors and the educational cost for individual workers to learn the skills required by sector 2. Skilled-labor supply can be expressed as

$$L_t^2 = \frac{w_t^2 - w_{1,t}^d}{c + \sigma} = \frac{(1 - \lambda)w_t^2}{c + \sigma}, \quad (11)$$

where c is the fixed educational cost while σ is the individual learning cost. The sum of these two items represents the educational cost. Equation (11) implies that all workers for whom the educational cost is less than the wage differential will join the technology sector, while those for whom the wage differential is not enough to pay for the educational cost will have to take a job in sector 1, if there is a vacancy, or stay unemployed. From sector 2's skilled-labor-supply equation, each increase in the wage of sector 2 pulls more workers into the technology sector 2:

$$L_t^2 = \left[\frac{(1-\lambda)(1-\alpha)A}{c+\sigma} \right]^{\frac{1}{1+\alpha}} (K_t^2)^{\frac{\alpha}{1+\alpha}}. \quad (12)$$

Equation (12) implies that the skill-biased structural change should increase the relative demand for skilled labor, which should lead to higher relative wages. Since the skilled labor supply curve for sector 2 is upward sloping, then the employment of skilled labor in sector 2 relative to unskilled labor in sector 1 will rise. Given that the total labor force is constant, the unskilled labor demand in sector 1 can be expressed as a function of the capital stock of sector 2:

$$L_t^1 = \lambda^{\frac{1}{\alpha}} \left[\frac{(1-\alpha)}{(c+\sigma)(1-\lambda)} \right]^{\frac{1}{1+\alpha}} K_1 (K_t^2)^{-\frac{1}{1+\alpha}}. \quad (13)$$

Skill-biased structural change creates jobs in sector 2. Owing to a rising wage determined by the central wage-bargaining system, however, domestic employment in sector 1 declines, and the international labor force, therefore, fills the demand-supply gap. The domestic job destruction is equal to the foreign labor force in sector 1, which can be expressed as

$$U_1 = M_1 = \bar{L}_1 - L_1 = (1-\alpha)^{\frac{1}{\alpha}} K_1 \left[\frac{1}{\sqrt[\alpha]{w_1}} - \frac{1}{\sqrt[\alpha]{\lambda w_2}} \right]. \quad (14)$$

Equation (14) shows that the institutional relationship between sector 1 and sector 2 ends up damaging employment opportunities for domestic unskilled labor in sector 1. Furthermore, the increase in unemployment coincides with an influx of foreign workers M_1 to sector 1. Total unemployment of the two-sector economy is

$$U_t = 1 - L_t^1 - L_t^2 = 1 - B_1 (K_t^2)^{-\frac{1}{1+\alpha}} - B_2 (K_t^2)^{\frac{\alpha}{1+\alpha}}, \quad (15)$$

where $B_1 = \lambda^{\frac{1}{\alpha}} \left[\frac{(1-\alpha)}{(c+\sigma)(1-\lambda)} \right]^{\frac{1}{1+\alpha}} K_1$ and $B_2 = \left[\frac{(1-\lambda)(1-\alpha)A}{c+\sigma} \right]^{\frac{1}{1+\alpha}}$.

Although sector 2 provides more job opportunities for skilled workers as the capital stock of sector 2 deepens, this increase can be offset or even outweighed by the job destruction for the unskilled in sector 1.¹¹ As a result, the unemployment rate would increase at least for some time, which can be proved below. The first-order condition of function (15) is

$$\frac{dU_t}{dK_t^2} = \left(\frac{1}{1+\alpha}\right)B_1(K_t^2)^{-\frac{2+\alpha}{1+\alpha}} - \left(\frac{\alpha}{1+\alpha}\right)B_2(K_t^2)^{-\frac{1}{1+\alpha}} = 0. \quad (16)$$

After some simplification, we get the value of the capital stock in sector 2 for the maximum unemployment in the economy:

$$K_2^* = \alpha \frac{B_2}{B_1} = \alpha A^{\frac{1}{1+\alpha}} (1-\lambda)^{\frac{2}{1+\alpha}} \lambda^{-\frac{1}{\alpha}}. \quad (17)$$

Therefore, equation (15) implies a U curve for the unemployment rate of the economy as a result of the structural change (Figure 4).

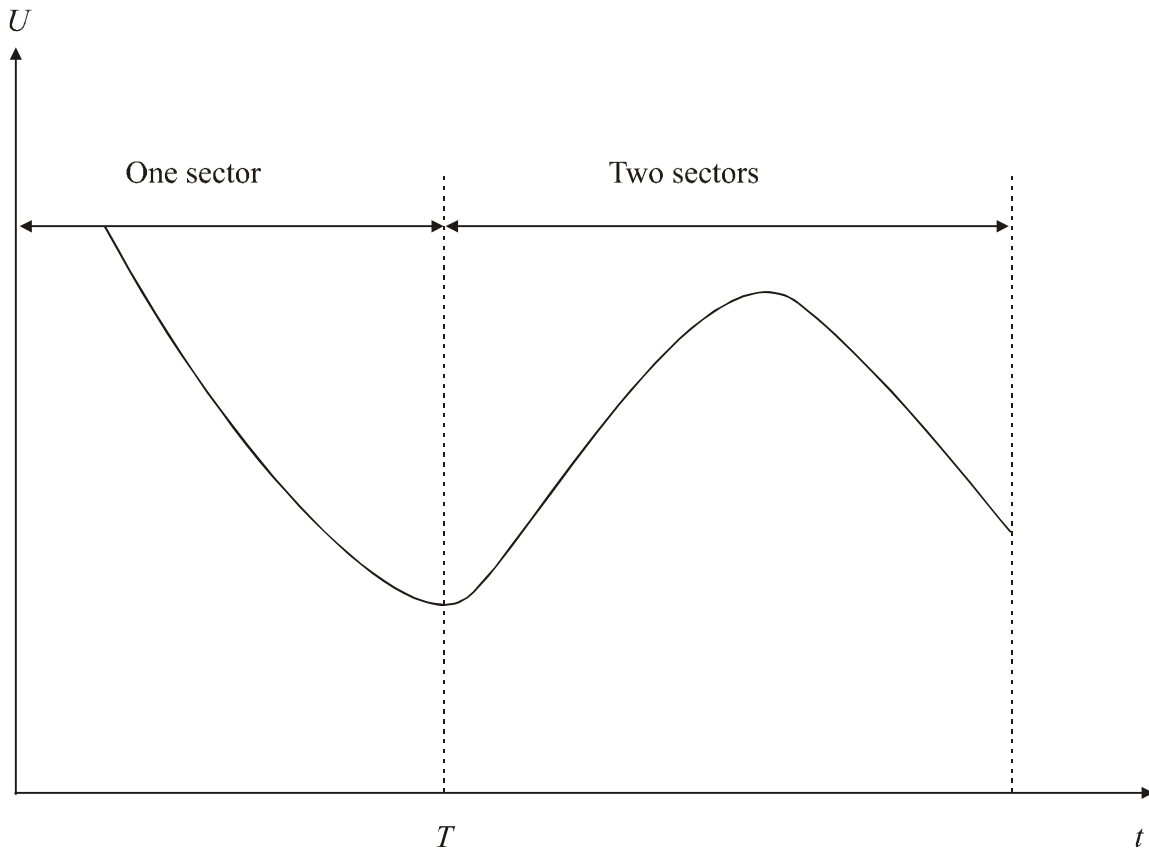
This process is likely to continue for some time in Mauritius, as sector 2 is expanded to encompass the information communications technology sector, another high-skilled, capital-intensive industry. Nonetheless, the model predicts that the unemployment rate might go down after a number of generations because job creation in sector 2 would be larger than the job destruction in sector 1 as an increasing skill premium would induce more and more workers to acquire skills and join sector 2. Owing to the diminishing returns of capital accumulation, however, the unemployment rate may not be able to fall to previous levels and, thus, may remain at a high level. The prediction of the model is also affected by the possibility of “multiple” technological revolutions over time, which may indefinitely prolong the unemployment problem.

V. CONCLUDING REMARKS AND POLICY RECOMMENDATIONS

The rapid structural changes during the 1990s have increased demand for skilled workers in the financial services and tourism sectors, relative to the low-skilled textile and sugar sectors. Against this background of profound structural change and strong growth performance, the unemployment rate in Mauritius has been steadily rising. In this paper, we argue that there are two main causes for rising unemployment. First, the highly centralized wage determination

¹¹ It is possible that unemployment in the traditional sectors in Mauritius could have also increased as firms took steps to economize on the use of labor in the face of rising wages. This can take the form of the substitution of capital for labor or increases in labor productivity. However, the evidence of this is not very compelling. For example, over the period 1982-2002, the capital/labor ratio in the EPZ increased by only 3 percent. In recent times, however, there has been increased mechanization in the sugar industry, although data on the capital/labor ratio is not readily available.

Figure 4. Mauritius: Unemployment and Structural Change



system in Mauritius limits the skill premium, resulting in job destruction in the traditional sector and insufficient job creation in the new technology sector. Second, the Mauritian education system has failed to impart to the low-skill-based labor force the higher skills that are needed by the emerging sectors, resulting in a skill mismatch problem.

We believe both supply-side and demand-side reforms will engender increased labor market flexibility, reduce the unemployment rate, and help sustain growth at the relatively high levels that Mauritius has enjoyed during the past two decades. On the supply side, the government is already upgrading its education system. The government's education reforms aim to increase the years of compulsory schooling from nine to eleven years by 2005; improve and increase access to primary and secondary schools; introduce information communications technology in primary and secondary schools; review the quality and relevance of the curricula; and reform the examination system at the primary level. To accompany these reforms, the government has significantly increased capital spending in the sector. These reforms will need to be aggressively pursued to reduce the skill mismatch in the economy.

The institutions governing the labor market in Mauritius are rigid and complex. It is recognized that the current institutions reflect a "social contract" that has been built up over

many years. However, while these institutions may have served the economy well in the past, all parties—including workers and employers—are likely to experience welfare losses under the current framework. To preserve some element of the “social contract,” the reforms could seek to establish a simplified, two-tier wage determination system. At the first-tier level, a national body consisting of government, employers, and workers could be maintained, but would be limited to setting indicative nonbinding wage guidelines. At the second-tier or firm level, collective bargaining should be encouraged. Such firm-level collective bargaining would allow firm- and sector-specific factors to be taken into account, including productivity levels.

REFERENCES

Bank of Mauritius, 2002, "Annual Report," Port Louis, Mauritius.

Caselli, Francesco, 1999, "Technological Revolutions," *American Economic Review*, Vol. 89 (March), pp.78-102.

Center for Applied Social Research, 2001, "Attitudes of the Unemployed Towards Accepting Employment in the Export Processing Zone in Mauritius," Port Louis, Mauritius.

Coe, David T., and others, 2002, *Mauritius—Selected Issues and Statistical Appendix*, IMF Staff Country Report No. 02/144 (Washington: International Monetary Fund).

Dowrick, Steve, and Norman Gemmell, 1991, "Industrialization, Catching Up and Economic Growth: A Comparative Study Across the World's Capitalist Economies," *Economic Journal*, Vol. 101 (March), pp. 263-75.

International Monetary Fund, 2003, *World Economic Outlook, April 2003: Growth and Institutions, World Economic and Financial Surveys* (Washington).

Juhn, Chinhui, Kevin M. Murphy, and Brooks Pierce, 1993, "Wage Inequality and the Rise in Returns to Skill," *Journal of Political Economy*, Vol. 101 (June), pp. 410-42.

Katz, Lawrence, and Kevin M. Murphy, 1992, "Changes in Relative Wages, 1963-1987: Supply and Demand Factors," *Quarterly Journal of Economics*, Vol. 107 (February), pp. 35-78.

Solow, Robert. M., 1956, "A Contribution to the Theory of Economic Growth," *Quarterly Journal of Economics*, Vol. 70 (February), pp. 65-94.