

Expenditure Composition and Economic Development in Benin



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Abstract

This paper estimates how changes in the composition of public expenditure affect growth, employment, and income inequality in Benin. These estimates are based on a model of labor market segmentation with partial labor mobility along the lines of Harris and Todaro (1970). The model is calibrated to fit the data for the Beninese economy over the period 2003–07. Despite some data limitations, the results obtained suggest that a shift in the composition of expenditure from wages to public investment would have beneficial effects on growth, employment, and income equality, particularly through its effects on wages and labor demand in the private formal sector; conversely, an increase in civil servants' wages, even if it were financed by grants, could result in lower growth, higher unemployment, and larger wage disparities across sectors.

CHAPTER

1

Introduction

In pursuit of their growth and development strategy, the Beninese authorities aim to step up public investment in infrastructure and human capital over the medium term (Table 1). The margin of maneuver in this direction will however be limited by the need to maintain a prudent fiscal policy to preserve macroeconomic stability. It will therefore be important to make an efficient use of the limited financial resources, by identifying the composition of public expenditure that best suits the country's growth and development objectives.

Following the rapid increase in the wage bill between 2007 and 2009, a large share of public expenditure in Benin is now being absorbed by wages and bonuses (Figure 1). Pressures to further increase expenditure on the wage bill are likely to continue, both from trade unions (demanding higher salaries) and from voters and political parties (aiming at expanding recruitment in the public sector). Under the goal of maintaining stability over the medium term, however, unless additional concessional resources become available, further increases in the wage bill could only be achieved by compressing public investment.

This study addresses these issues on the basis of a stylized model of the Beninese economy that highlights the tradeoff between expenditure on wages and investment. The model takes into account specific characteristics of the Beninese economy, including the large share of agriculture in employment and GDP, the large number of urban unemployed engaged in precarious informal sector activities, and the strong influence of labor unions in the formal labor market concentrated in the urban areas. The model is calibrated to fit recent economic data for Benin, and is used to estimate the impact of changes in the wage bill and in public investment, compared with the medium-term baseline scenario discussed by the IMF staff with the country

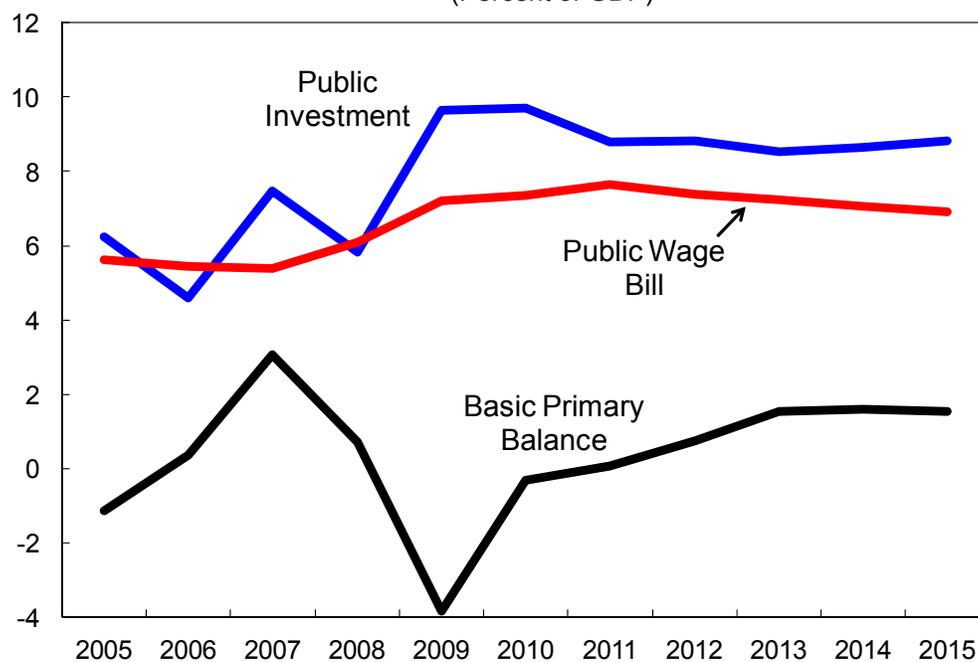
EXPENDITURE COMPOSITION AND ECONOMIC DEVELOPMENT IN BENIN

Table 1. Benin -- Key Fiscal Indicators, 2004–15
(Percent of GDP, unless otherwise indicated)

	Average 2004-08	2009	2010	Average 2011-15 (proj)
Public wage bill	5.6	7.2	7.4	7.2
Public investment	6.0	9.3	9.7	8.7
Total public expenditure	21.5	25.7	26.5	25.4
Basic primary balance	0.6	-3.8	-0.3	1.1
Overall fiscal balance	-3.4	-7.3	-5.9	-4.4
Memorandum:				
Real GDP growth (in percent)	3.9	2.7	3.2	5.6

Source: Beninese authorities; and Fund staff estimates and projections.

Figure 1. Benin: Key Fiscal Indicators, 2005–15
(Percent of GDP)



Sources: Beninese authorities; and Fund staff estimates and projections.

authorities during the 2010 Article IV Consultation.¹ This paper does not consider, however, the possibility of reducing the overall number of public employees, which lies beyond the scope of this study and is best addressed in the context of the authorities' ongoing efforts to reform the civil service. In this study, therefore, the size of the civil service is not assumed to change and all changes in the wage bill are assumed to derive from changes in the salaries and bonuses. In the same way, this study abstracts from the complexities involved in determining the optimal salary level for civil servants, such as the level that is necessary to ensure the recruitment of properly qualified staff, the impact of living costs, or a comparison with other countries in the sub-region. The public wage policy is a rather complex issue that cannot be completely addressed in this type of study.

The simulations obtained show that, if additional concessional resources become available, it would be most beneficial in terms of growth, employment, and income distribution, to use them to expand public investment rather than to grant wage increases to civil servants.

The paper is organized as follows: Chapter 2 describes the methodology used; Chapter 3 presents the results; and Chapter 4 discusses the policy implications. A detailed description of the model and the functioning of the dual labor market are discussed in the Appendices.

¹The latest Article IV Consultation Report for Benin (forthcoming) will be published at <http://www.imf.org/external/country/BEN/index.htm>.

The impact of the composition of expenditure on the country's development objectives has been assessed on the basis of a stylized model of the Beninese economy that focuses on the segmentation of the labor market into a rural and urban sector, and on the role of the government as a source of employment and as a supplier of capital and public services. The model, calibrated to replicate the recent economic performance and the baseline medium-term projections developed by Fund staff, has been used to compare the impact of an increase in the wage bill with that of an increase in public investment under different scenarios.

The Model

Like other small low-income countries in the region, Benin is characterized by the coexistence of a large, “traditional” rural sector with a more formal but less competitive urban sector. About 60 percent of the Beninese population lives in rural areas; agriculture (and related activities) account for about one-third of GDP, for one-fourth of exports of goods and services, and for about 70 percent of employment.² About 50 percent of the population is more or less directly employed in the cotton sector alone, concentrated in the north of the country. In addition, “informal” activities—typically, small-scale informal trade with Nigeria—account for a large and nonquantified share of the economy. The urban economy hosts about 30 percent of the labor force;³ it is centered on the public administration and on capital-intensive state-owned and private enterprises, where employees are organized in strong and active labor unions. Around this “formal” urban employment a variety of “informal” small-scale and poorly remunerated activities take place, like providing transportation, housekeeping, and other services to the formal sector and its better-paid employees.

²Fund staff estimates.

³Fund staff estimates.

Reflecting this economic structure, the labor market is segmented into two distinct sectors, the rural sector, which is more competitive but offers comparatively low “wages” (also including the income of self-employed workers and small entrepreneurs), and the urban sector, where strong labor unions are capable of negotiating comparatively high wages. These wages do not clear the market, and a number of urban dwellers remain effectively unemployed (although no official unemployment statistics are available), eking out a living barely above subsistence level through occasional and precarious informal activities. Mobility across sectors is limited—most notably by the costs involved in relocating from rural to urban areas—but the large wage differential between the two sectors encourages a gradual, ongoing migration of young workers to the cities in pursuit of better-paid jobs.

The economy of migration with dual labor markets has been analyzed in a series of studies following the seminal works of Todaro (1969) and Harris and Todaro (1970) (for a brief illustration see Appendix 2). In the urban sector, wages above the competitive market-clearing level result in structural unemployment as labor supply exceeds labor demand. Despite this, workers continue to migrate, hoping to find a well-paid job in the cities, as far as the wage differential between urban and rural areas, combined with the probability of finding a job in the city, remains sufficiently large. Migration stops only when the number of the unemployed is so large that the risk of remaining unemployed reduces the potential benefit of earning a higher wage in the urban areas.

The urban and rural sectors also differ in capital intensity. The urban economy is dominated by capital-intensive activities in industry and trade (including, in Benin, energy production and the port); typical rural activities such as agriculture and informal trade are instead more labor intensive. Both private and public capital are employed in the production process in both sectors; private capital is provided by private investors (including state-owned enterprises) and consists of machinery and equipment that is earmarked to a specific firm or unit of production, while public capital includes assets such as transportation and communication infrastructure, that are supplied by the government and made publicly available. Public capital can be extensively defined to include intangible assets such as the judicial system and the rule of law as well as the “human capital” enhanced through public investment in health and education. In the rural sector, public capital includes public infrastructure specifically provided for agriculture, such as irrigation, fertilizer supply, and marketing structures.

Private capital comes from domestic and foreign investment. The model assumes that domestic investment responds to disposable income (the income received by the workforce net of taxes) and to the marginal rate of

return on private capital, while foreign investment is assumed to be driven by exogenous factors.

The government plays three major roles: it supplies public capital through public investment; it provides employment and public services through the civil service (financed by the wage bill); and it raises taxes to finance these (and other) items of public expenditure.

The labor market for civil servants bears some similarities to the private urban labor market, not only because most civil servants work in urban areas (mostly in the official and administrative capitals, Porto Novo and Cotonou). Civil servants earn comparatively high salaries and bonuses, are organized in powerful labor unions, and enjoy a number of other benefits including comparatively generous social protection. The importance of the civil service in the larger labor market derives however mostly from the indirect influence of the pay level of civil servants on the wage negotiations between enterprises and labor unions. The wage level and structure of the civil service are used by urban employers and labor unions as a benchmark in their wage negotiations, and an increase in civil service wages has therefore strong repercussions on urban wages, labor demand, and unemployment.

A model incorporating these features has been calibrated to fit Benin's actual data for the period 2003–07;⁴ other parameters have been set to yield results in line with the medium-term macroeconomic projections elaborated by the Fund staff on occasion of the 2010 Article IV Consultation—considered here as the “baseline” for this analysis. The model has then been used to estimate the impact of alternative scenarios associated with different changes in the composition of expenditure compared with baseline projections.

The Scenarios

Four alternative scenarios have been considered; two involve the use of additional external grants amounting to about 2 percent of GDP to finance an increase in wages of civil servants (Scenario A) or additional public investment (Scenario B); the other two scenarios involve instead a reallocation of expenditure, from public investment to wages (Scenario C) or from wages to public investment (Scenario D). The magnitude of the

⁴2008 has been excluded from the estimation of some parameters owing to the particular conditions associated with the increase in international food and energy prices.

changes is the same under the four scenarios.⁵ As mentioned in Chapter 1, the changes in the public wage bill in Scenarios A, C, and D are assumed to be produced by variations in the average levels of wages and bonuses paid to public employees, with no change in the number of civil servants.

As the focus of this study is on the composition of public expenditure, effects associated with changes in the overall level of revenue or public expenditure have not been considered, although they would have a major impact on the economy. Tax revenue has been assumed to remain, under all scenarios, at the same level projected under the baseline, with tax rates adjusting to the changes in the tax base. Public expenditure increases compared to the baseline in Scenarios A and B, but this increase is assumed to be financed entirely by external grants, with no burden for current or future domestic taxpayers. In Scenarios C and D, the overall expenditure envelope is the same as in the baseline.

The economic performance has been assessed on the basis of three indicators: real GDP growth, the rate of unemployment (as a measure of poverty), and the ratio of rural to urban wages (as a measure of disparities in income distribution).

The calibration exercise is made more complicated by the limited availability of data. Thus, particular attention was given to the choice of data and the setting of proxies for unavailable time series. Labor force data were derived from Mongardini and Samake (2009) and from the World Development Indicators database of the World Bank. The distribution of the labor force between the rural and urban sectors was estimated to be proportional to the distribution of rural and urban population. The stock of private and public capital was estimated from the series of private and public investment, drawing again from Mongardini and Samake (2009). Owing to the lack of data, the average *level* of real wages in the rural and urban areas, and the marginal real return on capital, were calibrated to give the best fit to the assumptions of the model.

⁵Scenarios A and B entail an increase in public expenditure by CFAF 60 million, equivalent to about 2 percent of GDP in 2010; Scenarios C and D entail an increase (decrease) in the public wage bill by CFAF 30 million and a reduction (increase) in public investment by the same amount; the net change in public expenditure is zero but the impulse produced on the rest of the economy is equal to the sum of the two changes, hence CFAF 60 million.

The results obtained show that public investment should have greater priority than increases in the public wage bill in the allocation of the limited resources available for public expenditure. An increase in public wages worsens *all* medium-term economic indicators even when it is financed by external grants; by comparison, an increase in public investment improves most indicators (Table 2).

Under Scenario A (in which additional grants are used to increase the wages of civil servants) average annual real GDP growth between 2010 and 2015 declines by 0.4 percentage points compared to the baseline, as the wage increases granted to civil servants trigger higher private sector wage demands in the urban sector which, in turn, discourage private investment and economic activity. This is barely compensated by an increase of production in the rural sector. Higher urban wages also result in higher rates of unemployment and in higher wage disparities between the rural and urban sector (Figure 2).

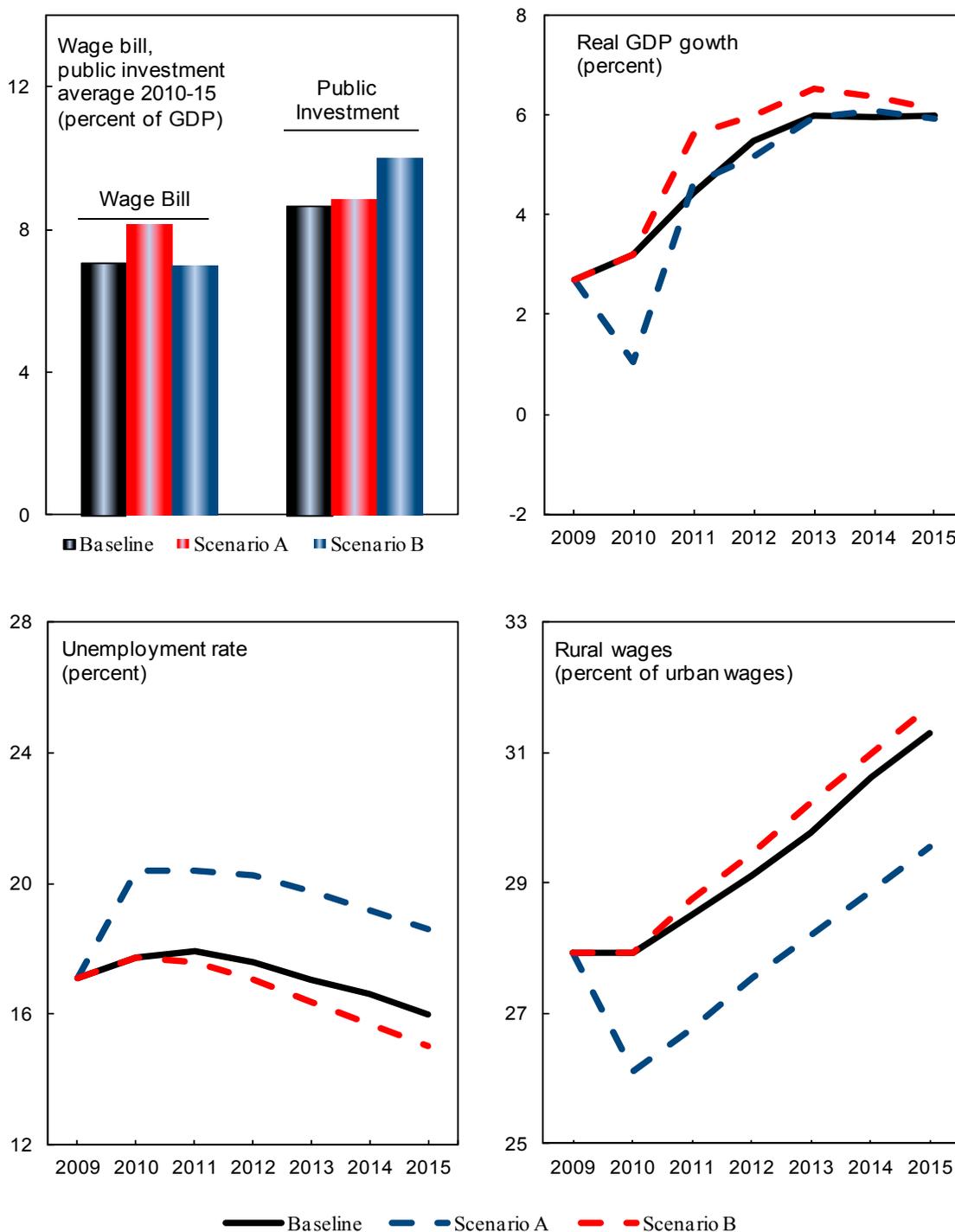
Under Scenario B (in which grants are used to finance higher public investment), real GDP growth over the medium term exceeds baseline projections by 0.4 percentage points, as the larger public investment generates higher productivity in both sectors of the economy, which in turn increases labor demand. Higher marginal returns to labor with unchanged nominal wages encourage labor demand in the formal sector, thus reducing unemployment. Rural wages increase as the improved prospects of finding a job in the cities attract workers away from rural areas (Figure 2).

Table 2. Benin – Simulations of Economic Performance under Four Alternative Scenarios, 2010-2015.

Baseline	Grant-financed increase in public expenditure		No change in the overall expenditure envelope		
	Scenario A	Scenario B	Scenario C	Scenario D	
	Spent on wage increases	Spent on higher public investment	Wage increase financed by cuts in Higher wages and lower public investment	Higher public investment financed by cuts in wages	
Real GDP growth, annual average, 2010-15	5.2	4.8	5.6	4.7	5.7
Rate of unemployment, 2015	16.0	18.6	15.0	18.7	12.5
Rate of unemployment, average 2010-15	17.2	19.8	16.6	19.9	13.8
Rural wages, in percent of urban wages	31.3	29.6	31.7	29.5	32.9

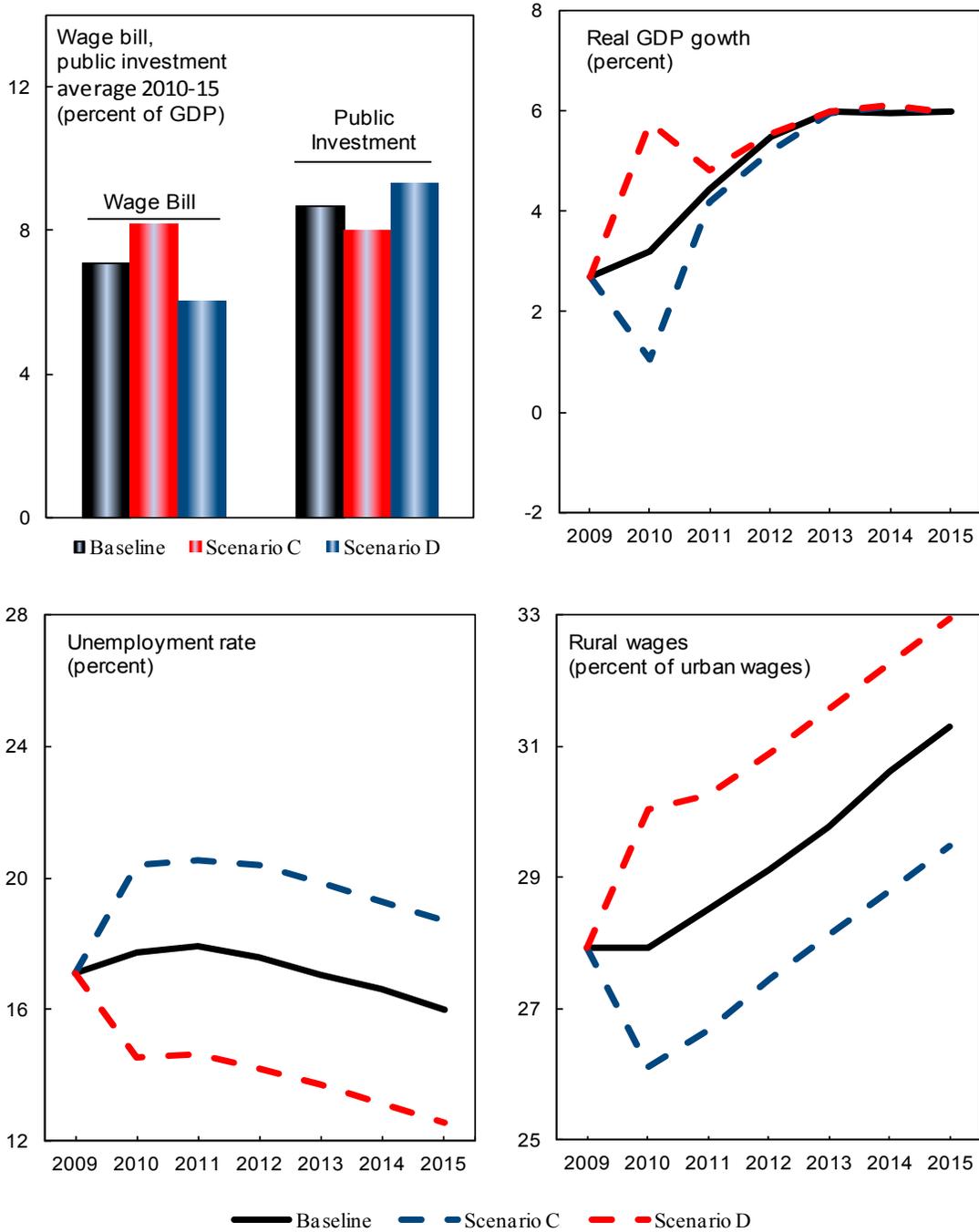
Source: Fund staff analysis and projections

Figure 2. Benin: Key Economic Indicators under Alternative Scenarios, 2009-15



Sources: Beninese authorities; and Fund staff estimates and projections.

Figure 2. Benin: Key Economic Indicators under Alternative Scenarios, 2009-15 (cont'd)



Sources: Beninese authorities; and Fund staff estimates and projections.

Scenario C (in which higher wages for civil servants are financed by cutting public investment under an unchanged expenditure envelope) yields performance indicators that are remarkably close (and slightly worse) to Scenario A. Annual real GDP growth declines by $\frac{1}{2}$ of 1 percent on average compared with the baseline, unemployment increases, and the urban-rural wage differential widens (Figure 2 cont'd).

Scenario D might be considered as mainly hypothetical (a reduction in the wage level of civil servants that would grant savings of 1 percent of GDP would be politically difficult to enforce in the short term and could involve complex legal issues), but a similar outcome might be achieved through a comprehensive reform of the civil service. The results obtained under this scenario provide interesting insights into the economic impact of the composition of public expenditure. By construction, the results are the mirror image of Scenario C, but it is interesting to compare them with the effects that arise when an increase in investment is instead financed by grants, as under Scenario B. Remarkably, Scenario D yields the best performance indicators of all four scenarios despite the fact that it does not entail any transfer of resources from the rest of the world. Real GDP growth increases by half a percentage point compared to the baseline, unemployment declines by $3\frac{1}{2}$ percentage points, and the wage differential across sectors narrows. These improvements stem from the spillover of civil service wages to the other sectors of the economy. In the private urban sector, a cut in civil service wages would weaken union demands, encouraging hiring and private investment. Lower unemployment encourages migration to the cities, despite the reduced wage level; the ensuing labor scarcity in rural areas produces upward pressures on rural wages, reducing the wage differential. Lower unemployment and higher investment increase growth despite the decline in rural production caused by the migration to the cities (Figure 2 cont'd).

These effects are in line with expectations. In this model, an increase in the wage bill yields direct benefits for civil servants in the period in which it occurs, but also encourages stronger demands on the part of the trade unions, that end up reducing employment and private investment in the urban sector, with a negative overall impact on income and employment. Conversely, an increase in public investment produces, with a lag, indirect benefits for the whole economy: it increases productivity and thus encourages employment and private investment, leading to an increase in average wages. Moreover, whereas the benefits of an increase in public wages occur only in the period in which this increase is in force, an increase in public investment produces long-term benefits through an accumulation of public capital which is subject only to a gradual depreciation.

Policy Implications and Conclusion

The outcome of this analysis is subject to various limitations, not least associated with the scarcity of data and with the margin of error involved in assessing the performance of a complex economy like that of Benin on the basis of a stylized model. Nevertheless, the results obtained bear some suggestions which have important potential implications for fiscal policy and deserve further consideration. It would be useful to bear in mind these results during the budget preparation process, when the Beninese authorities are confronted with competing demands (most notably from civil servants' labor unions) and tight budget constraints.

An important result returned by the model is that excessive increases in wages to civil servants can hurt Benin's economic development even when they are not financed by compressing public investment (using instead external concessional financing). Scenarios A and C exhibit a worse outcome compared with the baseline not only in terms of growth but also in terms of unemployment (and thus poverty) and income distribution (larger wage differentials between the urban and the rural sectors). On the other hand, the results confirm that increasing public investment in viable, productivity-enhancing projects is beneficial to growth and reduces unemployment and income inequality. The results also support the policy option of increasing the fiscal space for public investment by a comprehensive reform of the civil service. This policy action could sensibly improve some key development indicators, by reducing wage demands in the urban sector and by increasing the stock of public capital employed in production.

Unless additional external concessional resources become available, it would therefore be advisable to contain the growth in the public wage bill within the limits projected under the baseline scenario. An increase beyond these limits could jeopardize the pursuit of the Benin's economic and development objectives, producing lower growth, more unemployment and poverty, and larger wage disparities. Even if new concessional funds can be mobilized (in the form of grants or highly concessional loans), they should be preferably used to increase public investment in viable projects. Using these funds to

grant additional wage increases to civil servants risks to weaken the benefits associated with a transfer of resources from the rest of the world, by strengthening wage demands —and hence discouraging investment— in the private sector.

It should be underlined that this study has not discussed the appropriate size of the public sector. Although some areas of the public administration might be overstaffed, it is also possible that the number of civil servants in key priority sectors (such as health and education) may need to be increased to make progress toward Benin's Millennium Development Goals. This type of issues lie beyond the scope of this paper, and are best addressed in the context of the reform of the civil service currently underway.

1

The Model

Production. Production in the rural and urban sectors of the economy employs labor and private and public capital. The value-added in each sector follows a Cobb-Douglas function:

$$y_t^U = A_t k_t^{Ua} b_t^{U\beta} L_t^{U(1-a-\beta)}$$

$$y_t^R = A_t k_t^{Ra'} b_t^{R\beta'} L_t^{R(1-a'-\beta')}$$

where the U and R superscripts denote the urban and rural sector respectively, b and k are, respectively, the stocks of public and private capital, A_t is a scale factor representing total factor productivity, and a , a' , β , and β' are coefficients that represent the share of each factor in production.

The public sector produces services free of charge, and its output is valued at factor costs and equal to the public wage bill:

$$y_t^P = w^P L_t^P$$

Labor demand. In each sector, the enterprises hire workers until the marginal productivity of labor (equal to $(1-a-\beta)y_t^U/L_t^U$ in the urban sector and to $(1-a'-\beta')y_t^R/L_t^R$ in the rural sector) is equal to the wage level. In the rural sector, the wage level is flexible and adjusts to equalize labor demand and labor supply, yielding:

$$w_t^R = (1-a'-\beta')y_t^R/\underline{L}_t^R$$

where \underline{L}_t^R is the rural labor supply (which in the short term is given). In the urban sector, wages are given, yielding the urban labor demand function

$$L_t^U = (1-a-\beta)y_t^U/w_t^U = \{ (1-a-\beta) A_t k_t^{Ua} b_t^{U\beta} / w_t^U \}^{1/(a+\beta)}$$

Labor demand in the public sector is exogenously determined by the government.

Labor supply. Total labor supply increases in line with population growth:

$$L_t = L_{t-1} (1+g)$$

where g is the natural growth rate of the population. Labor supply in each sector is fixed at any time. Labor supply for the public sector is not defined; for the purposes of the model, it is assumed that civil servants are hired randomly among the entire labor force (for instance, selecting the workers with the relevant skills which are assumed to be evenly distributed between rural and urban areas).

Over time, labor supply in the rural and urban sector changes as a result of migration:

$$\underline{L}_t^R = \underline{L}_{t-1}^R - MIG_{t-1}$$

$$\underline{L}_t^U = \underline{L}_{t-1}^U + MIG_{t-1}$$

where \underline{L}^U is the short-term urban labor supply and MIG_t is the number of workers that migrate from the country to the city at the end of period t .

Migration responds to the wage differential between the rural and urban sector according to the function

$$MIG_t = \xi \underline{L}_t^R (w_t^U (1-\tau) / w_t^R) (\underline{L}_t^U / L_t^U)$$

where ξ is a coefficient that measures the speed of migration and τ is the income tax rate (it is assumed that income taxes are only paid in the urban and public sector).

Unemployment is equal to the difference between urban labor supply and urban labor demand:

$$U_t = \underline{L}_t^U - L_t^U$$

In equilibrium, there is no migration and wages in the two sectors satisfy the equality:

$$w_t^R = w_t^U (1-\tau) (\underline{L}_t^U / L_t^U).$$

Capital and investment. The stock of capital (both private and public) increases over time as a result of (public and private) investment:

$$k_t^{U,R} = k_{t-1}^{U,R} (1-\delta) + IPR_{t-1}^{U,R}$$

$$b_t^{U,R} = b_{t-1}^{U,R} (1-\delta) + IPB_{t-1}^{U,R}$$

where δ is the rate of depreciation, and IPR and IPB are private and public investment, respectively.

Public investment in each sector is decided by the government, while private investment is equal to the sum of foreign direct investment (FDI) and domestic private investment. Domestic private investment, in turn, depends on disposable income and on the marginal rate of return on capital:

$$IPR_t = \zeta Y^D_t r_t + FDI_t$$

Where $IPR = IPR^U + IPR^R$ is the sum of private investment in the urban and rural sector, ζ is a coefficient, Y^D is disposable income (net of taxes), and r is the marginal rate of return on capital, which is equalized across sectors and equal to

$$r_t = a^R y^R_t / k^R_t = a^U y^U_t / k^U_t$$

Private investment is, in turn, allocated across sectors to equalize the marginal rate of return.

The government budget. Abstracting from other items, public expenditure is equal to the sum of the public wage bill and public investment:

$$PE_t = w^P L_t^P + IPB^U_t + IPB^R_t$$

where PE_t is public expenditure. Public expenditure is financed with income and consumption taxes and external grants, under a hard budget constraint. In this study the value of tax revenue and grants is taken as given.

Income and taxes. The gross domestic product (GDP) is measured at market prices as the sum of the value-added of the three sectors and of consumption taxes:

$$GDP_t = y^U_t + y^R_t + w^P L_t^P + TAXC_t$$

where $TAXC$ is the total amount of consumption taxes paid by the citizens (consumption tax revenue for the government).

Urban workers and investors, as well as civil servants, also pay income taxes on their wages; the net *disposable* income (that can be spent by the citizens for consumption and investment) is thus equal to

$$y^D_t = GDP_t - ITAX_t$$

where $ITAX$ is the total amount of income taxes paid by the citizens (income tax revenue for the government). The average income tax rate is derived by

dividing the income tax revenue by the income tax base, which is equal to the income of the urban and public sector (under the assumption that the rural sector pays no income taxes):

$$\tau_t = ITAX_t / (y_t^U + w_t^P L^P)$$

2

The Labor Market

The labor market in this study has been formalized on the basis of the framework proposed by Todaro (1969) and Harris and Todaro (1970) (see also Corden and Findlay, 1975), which has also been used in more recent macroeconomic models of developing countries (for instance, Bodart and Le Dem, 1996; Agénor *et al.*, 2006).

The labor market is articulated in two broad “private” sectors, the “rural” sector and the “urban” sector. In addition, the civil service can be considered as a third, “public” sector that plays a distinct role from the other two.

At any moment in time, each worker that is not hired as a civil servant can only work in one of the two private sector depending on his place of residence: workers living in cities can only work in the urban sector, while workers living in the country can only be employed in rural activities. Workers can however change their place of residence (migrate) between one period and the next. Migration entails adaptation costs; hence, only a fraction of all the workers who would find migration convenient do actually migrate at any moment in time.

The rural labor market is competitive; wages are set at the level that clears the market, and adjust in each period to the level that equalizes labor supply with labor demand. Labor supply is given in each period since workers only migrate *between* periods; labor demand, in turn, depends on the marginal productivity of labor, which is related to the stock of private and public capital that has been invested in that sector. Other things being equal, the productivity of labor declines as the number of workers increases, and the wage level therefore declines with the number of rural workers.

The urban labor market is instead dominated by labor unions. Wages are set in bilateral negotiations between employers and union representatives, and do not normally clear the market. Labor demand, which equalizes the marginal productivity of labor with the negotiated wage, is typically lower than labor supply, which is given in each period; as a result, some urban

workers remain involuntarily unemployed, or engage in precarious “informal” activities that yield a much lower income.¹

The public labor market is still different. Eligibility for public employment depends less on the place of residence than on other characteristics, such as the educational background. Labor demand is set by the government on the basis of staffing needs, which are less directly related to marginal productivity; civil servants are typically hired on long-term contracts, which limit new recruitment to levels close to the natural turnover.² For the purposes of the model, it is assumed that new civil servants are randomly hired at any period from workers throughout the country, independently of their place of residence.

At any period, workers decide whether they should migrate to the other sector in the next period, by comparing the wage they can *expect* to receive in either of the two private sectors. Since all rural workers are employed at any time, the expected wage in the rural sector is equal to the current wage offered to rural workers. In the urban sector, instead, some workers are unemployed and the expected wage is equal to the wage offered to the workers that are hired multiplied by the probability of being hired. Assuming that workers are hired randomly in each period among the entire pool of urban workers (that is, on short-term contracts), the probability of being hired is equal to the ratio between labor demand and labor supply. Workers thus migrate *from the rural to the urban sector* if and only if the expected value of urban wages exceeds the rural wages, that is, if and only if

$$w^R < w^U (L^U / (L^U + U)) \quad [1]$$

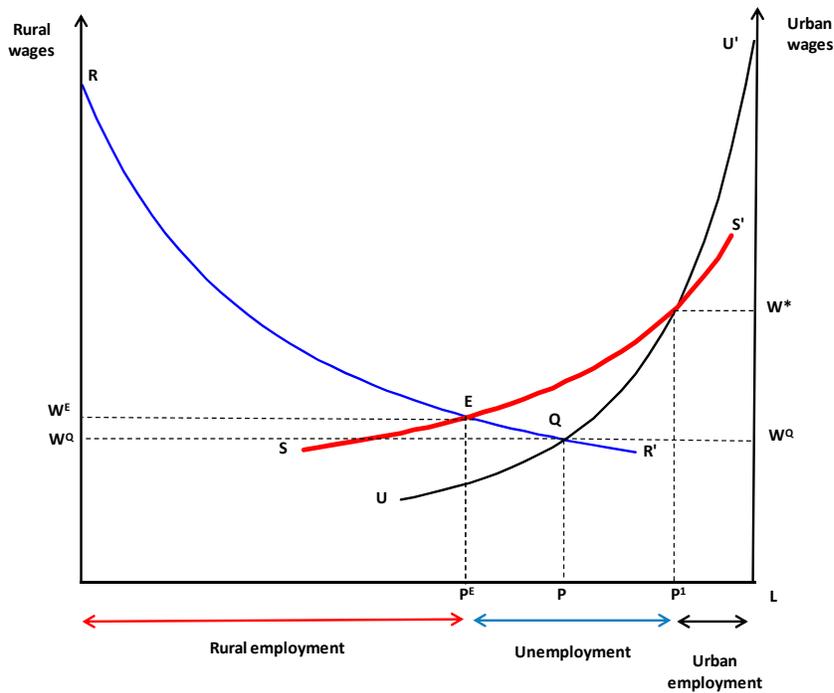
where w^R is the level of rural wages, w^U is the level of urban wages, L^U is urban labor demand and U is (urban) unemployment (measured by number of workers without a job). If $w^R > w^U (L^U / (L^U + U))$, workers migrate from the urban to the rural sector.

As mentioned above, only a fraction of workers who are potentially willing to migrate does actually migrate at any time. Migration, in turn, reduces the wage differential and thereby plays an equilibrating role. If the expected urban wages are too high, workers migrate to the cities; since urban labor

¹For simplicity, we shall assume that the unemployed earn no income at all; of course, all workers must be able to spend a minimum amount to ensure their subsistence during their period of unemployment, but these funds may be provided by sources other than labor income, such as accumulated savings or transfers from the government, NGOs, or employed and expatriated family members.

²The public sector was not included in the original Harris-Todaro (1970) model but is found in more recent models that have applied the Harris-Todaro framework, such as Bodart and Le Dem (1996) and Agenor *et al.* (2006).

Figure A.1



demand does not change migration results in an increase in unemployment, which reduces the *expected* value of urban wages; at the same time, migration reduces rural labor supply, producing an increase in rural wages. The opposite occurs when migrants move from the cities to the country. In equilibrium, the number of workers unemployed is just sufficient to equalize the expected value of urban wages with the rural wages, and migration stops. The wage differential between the two sectors results in persistent urban unemployment.

The labor market equilibrium for different levels of wages is illustrated in Figure A.1. The segment OL measures the total private sector labor supply, defined as the number of workers not employed in the civil service; each point along this line represents a different division of labor supply between the two private sectors; labor supply in the rural sector is measured left to right, while labor supply in the urban sector is measured right to left. For instance, at point P the labor supply in the rural sector is equal to OP while the labor supply in the urban sector is equal to PL .

The lines RR' and UU' represent the rural and urban labor demand, respectively, at different wage levels. The two lines intersect at point Q , at a

wage level equal to w^{ℓ} ; when this level is offered in the two sectors, total labor demand is equal to total labor supply and there is no unemployment.

Assume now that, as a result of union demands or government regulation, wages in the urban sector are raised from w^{ℓ} to w^* ; at this level, labor demand in the formal sector diminishes from PL to $P'L$ along the line UU' ; before migration occurs, a number $P'P$ of urban workers remain unemployed, while the rural labor supply remains equal to OP and rural wages remain at w^{ℓ} . Over time, migration restores equilibrium between the two sectors along the line SS' , which represents the long-term labor supply corresponding to the urban wage level w^* . Along this line, the wage differential between the two sectors satisfies the equality $w^R = w^* (L^U / (L^U + U))$ and no workers are willing to migrate; if – by hypothesis – rural wages were equal to w^* , all unemployed workers would migrate to the rural sector and the rural labor supply would be equal to OL' ; when instead rural wages are below w^* , migration stops before full employment has been reached; at this point, the risk of remaining unemployed in the city is exactly compensated by the prospect of earning a higher wage if employed, and no workers migrate either way. Equilibrium is reached at point E , where the rural labor demand and long-term labor supply curves intersect; at this point, rural wages are equal to w^E and rural labor demand and supply coincide and are equal to OP^E ; urban labor supply is equal to $P^E L$, but urban labor demand is only equal to $P' L$, and $P^E P'$ workers remain unemployed; the wage differential $w^* - w^E$ is just sufficient to compensate for the risk of remaining unemployed in the urban sector, and no workers are therefore willing to migrate.

It should be noted that the long-term labor supply curve shifts with the urban wage level (Figure A.2). If urban wages increase from w^* to w^{**} , the long-term labor supply curve shifts from SS' to S^*S^{*} , which satisfies the new equality $w^R = w^{**} (L^U / (L^U + U))$; in general, when migration stops, labor supply in each of the two sectors satisfies the equality $w^R = w^U (L^U / (L^U + U))$. If urban labor demand is sufficiently rigid, the new curve S^2S^2 lies to the left of SS' (Figure A.2); in the new equilibrium point E^2 , rural wages are higher ($w^2 > w^E$) but there is more unemployment, as less workers are now employed in the rural sector while urban labor demand is also lower; the larger wage differential has attracted workers to the urban sector despite the larger risk of remaining without a job.

Consider, now, the impact of an exogenous shift in labor demand, caused, for instance, by an increase in productivity induced by technological change or by the accumulation of capital. If the rural labor demand curve shifts from RR' to R^3R^3 (Figure A.3), at point E , the labor market is no longer in equilibrium; excess rural labor demand puts upward pressures on rural wages,

Figure A.2

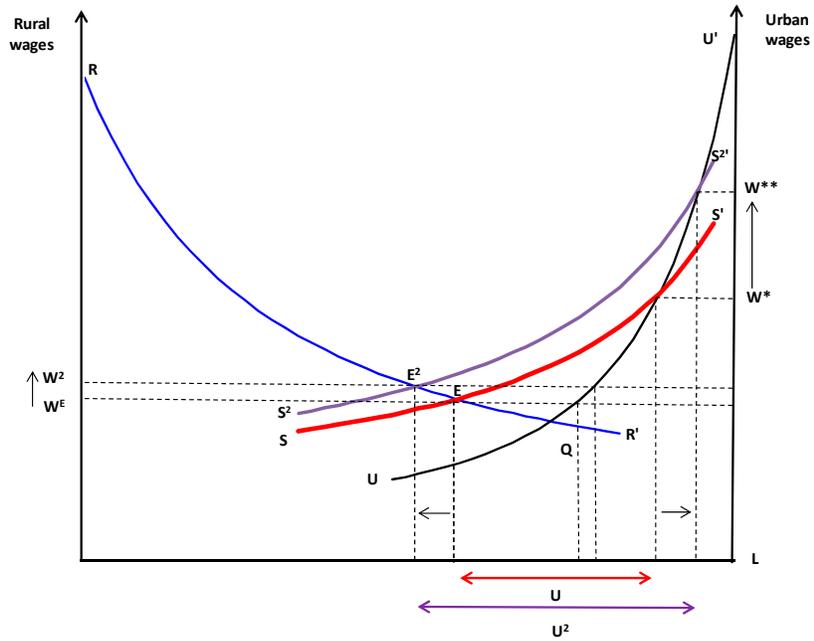
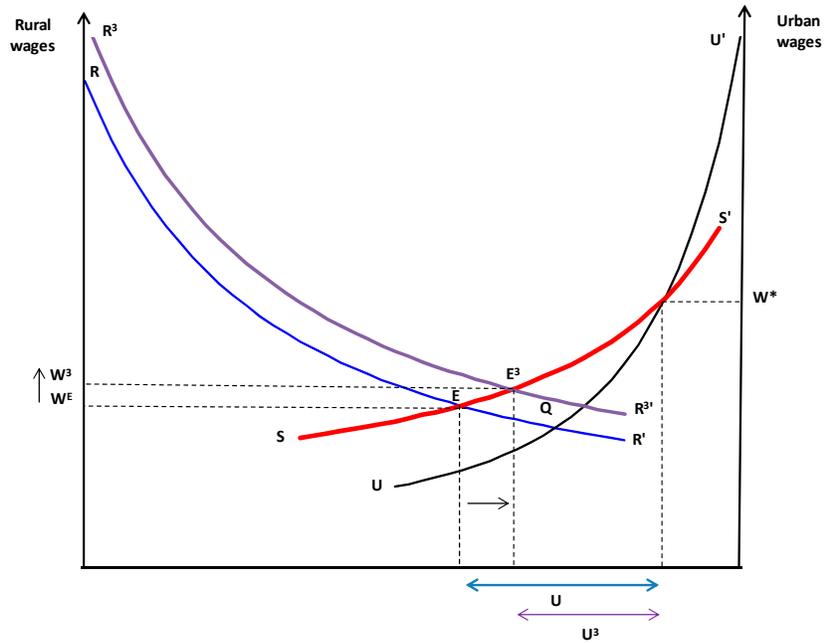


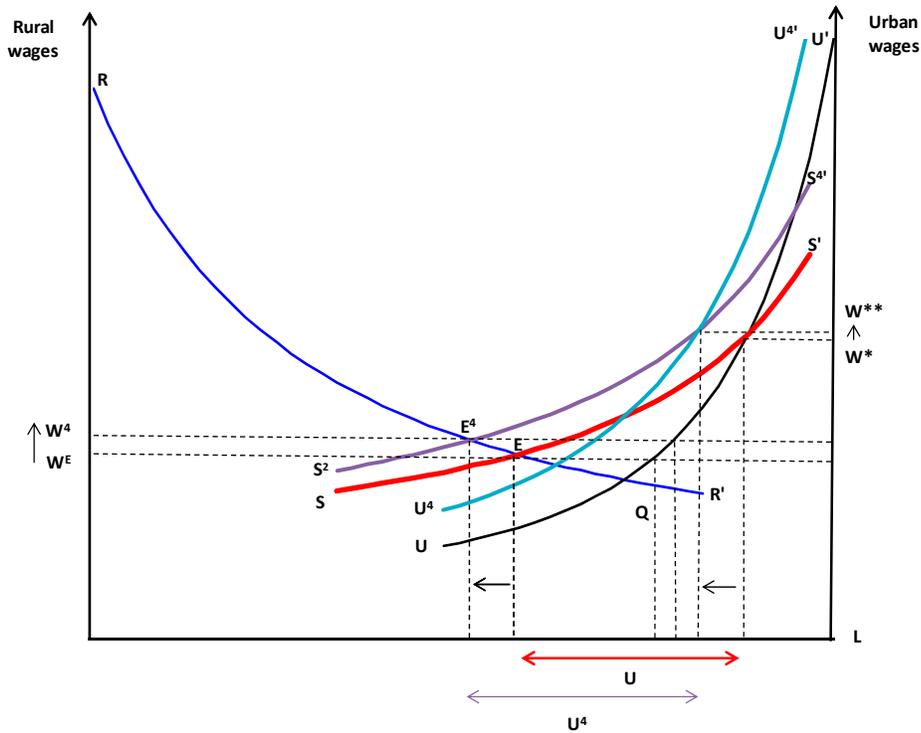
Figure A.3



attracting workers from the cities; this, in turn, reduces unemployment. The new equilibrium lies at point E^3 where the new rural labor demand curve R^3R^3' intersects the long-term labor supply curve SS^3 ; at this point, unemployment is lower while rural employment and wages are higher; urban employment and wages are unchanged.

If the urban sector demand curve shifts to the left (as a result of an increase in productivity or capital accumulation), with an unchanged level of wages, labor demand increases from LP^1 to LP^4 (Figure A.4). The long-term labor supply curve also shifts to the left, from SS^1 to S^4S^4' , as the increased number of job opportunities attracts more workers to the cities. Point E is not an equilibrium as the expected wages in the city at that level of urban labor supply exceed the wages offered in the country. Workers therefore migrate until the economy reaches the new equilibrium at E^4 , where rural wages are higher, rural employment lower, the *number* of unemployed workers is larger but the *proportion* of unemployed to employed urban workers is lower, reflecting the narrower wage differential between the two sectors.

Figure A.4



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