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Effects of Fiscal Policy under Free Factor Migration

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Abstract

The effects of fiscal policy are examined in a neo-Keynesian macroeconomic model under perfect factor mobility. The key finding is that, even in the classical regime of the model, fiscal policy may have real effects: a positive policy shock motivates emigration of labour and immigration of capital and vice versa. The effect on labour migration is the stronger the higher are the local adjustment costs as compared to the mobility costs. The effect on capital migration is clear as far as the real interest rate is the relevant market parameter.

1 Introduction

The conventional wisdom of the Neo-Keynesian Synthesis concerning the macroeconomic effects of fiscal policy is that the policy is neutral in real terms in the long run. On the short run there may exist real effects because of e.g. nominal wage rigidity, adaptive expectations and overlapping contracts. In this paper, however, it is argued that under perfect factor mobility fiscal policy may have real effects even in the classical long-term case.

In the paper flexible nominal wages, perfect foresight and continuously revisable contracts are assumed in an economy consisting of a multiple of self sustainable local economies. The production factors labour and capital are assumed to be perfectly mobile and the final goods totally immobile between the local economies. The particular local economy under consideration is assumed to be of atomistic size as compared to the rest of the economy.

The main point is to show that, in the classical regime of the macroeconomic model, fiscal policy may cause real effects in the form of factor movements between the local economies. Real effects on the geographical factor allocation are shown to emerge even though the employment of the factors, production and social welfare remain unaffected everywhere.

The paper proceeds as follows. Section 2 presents the Neo-Keynesian macroeconomic model of the local economy. The model includes the supply of final commodities determined classically by the factor markets and the production function, and the demand for the commodities determined by the Keynesian IS-LM model. Section 3 yields graphical analysis of the effects of expansionary fiscal policy. Section 4 concludes the findings.

2 The model

Consider a self sustainable local economy consisting of a geographically combined set of competitive factor and commodity markets. On the aggregate level in the local economy, the supply side in the commodity market is determined by the production function and by the factor market conditions. The local aggregate production function is

$$(1) \quad q = f(L, K),$$

where q is the supply of final commodities, L is labour, and K is capital. The standard assumptions apply, namely $f_L, f_K > 0$, $f_{LL}, f_{KK} < 0$, $f_{LK} = f_{KL} > 0$. The local factor market conditions are also described in the classical way. Aggregate labour demand in the local labour market is derived from competitive profit maximisation of the local firms and reads

$$(2) \quad w = p f_L,$$

where w denotes nominal wages and p denotes the price level. Function (2) says that nominal wages can, at the highest, equal the marginal revenue product of labour. The labour demand curve has a negative slope in L - w space by the properties of the production function (1). Aggregate labour supply is derived from people's optimal time use decisions. This yields in inverse form

$$(3) \quad w = pg(L)$$

where the right-hand-side tells the market valuation of time. By assumption $g' > 0$, so that the labour supply curve is upward sloping in the L - w space. In the local capital market, the aggregate demand for capital derived from firms' profit maximisation reads after manipulation

$$(4) p = rf_K,$$

where r denotes the market interest rate. By the properties of the production function, the capital demand curve (4) has a positive slope in K - p space. The local supply of capital is derived from people's saving decisions. The aggregate supply function reads in inverse form

$$(5) p = r/\varphi(K),$$

where $\varphi' > 0$ by assumption reflecting the classical viewpoint that aggregate saving responds positively to its market yield. Thus, the capital supply curve has a negative slope in the K - p space. The functions (1)–(5) determine the aggregate supply in the local commodity market. In graphical terms the aggregate supply schedule (the AS curve) is vertical in the q - p space in the classical regime of the model.

The aggregate demand conditions of the local economy are determined by the Keynesian IS-LM model. The real side equilibrium condition of the local economy (the IS curve) is given by the income-expenditure identity

$$(6) q = c(q) + i(r) + b,$$

where c denotes consumption, i denotes investment and b refers to the budgetary status of the local government. Assuming that $c' > 0$ and $i' < 0$ the IS curve is declining in the q - r space. By definition, expansionary fiscal policy turns an initially balanced budget ($b = 0$) into deficit ($b > 0$), and contractive policy into surplus ($b < 0$). Expansionary fiscal policy thus shifts the IS curve

outwards and vice versa. The respective monetary equilibrium of the local economy (the LM curve) is given by the liquid money market equation

$$(7) \quad m/p = l(q,r),$$

which says that the real supply of money equals the demand of money. The demand for money is reasoned by transaction purposes depending on production q and by inter-temporal purposes depending on the interest rate r . The Keynesian assumptions $l_q > 0$ and $l_r < 0$ say that the LM curve slopes upwards in the q - r space.

Equations (6) and (7) give the aggregate demand, the AD curve, in the local commodity market. The AD curve has a negative slope in the q - p space. The policy induced shifts of the IS curve manifest in corresponding shifts of the AD curve.

3 Effects of fiscal policy

Examine the effects of fiscal policy in the Neo-Keynesian model constructed in the previous section. Recall that the local economy is in the classical regime of the model and that the production factors are perfectly mobile while the final consumption goods are totally immobile. In particular, the local production technology is assumed to be constant during the period of analysis.

Figure 1 below describes the situation in the local economy before and after the policy impact. The Figure is composed of two Panels. Panel (i) presents the labour market, the production function (with K constant) and the commodity market with respect to the real wage $\omega = w/p$. Panel (ii) presents the capital market, the production function (with L constant) and the IS-LM equilibrium with respect to the real interest rate $\rho = r/p$. The Panels have two variables in common, namely real

production q and the price level p . It is assumed that there initially exists an equilibrium within and between the local economies so that the equilibrium real wage ω^* and the equilibrium real interest rate ρ^* in the considered atomistic local economy equal to those in the rest of the economy.

(Figure 1 here)

In Panel (i) of Figure 1, the local labour market is in equilibrium at point e_0 for nominal wages w_0 , which gives L_0 for employment and q_0 for production. The aggregate supply curve AS is vertical at q_0 . The aggregate demand curve AD_0 determined by the IS-LM equilibrium Σ_0 of Panel (ii) intersects the aggregate supply curve AS at E_0 , which gives p_0 for the equilibrium price level. The budget of the local government is assumed to be initially in balance, $b = 0$.

The IS-LM equilibrium Σ_0 of Panel (ii) of Figure 1 is supported by the capital market equilibrium ε_0 , which corresponds to the price level p_0 determined in the commodity market. The capital market equilibrium gives K_0 for the equilibrium capital stock, which together with L_0 yields the production q_0 . The equilibrium nominal interest rate is r_0 .

Now suppose that there emerges an exogenous demand shock caused by expansionary fiscal policy. That is, the local government launches a budget deficit, $b > 0$. The conventional result is that, under the classical regime of the Neo-Keynesian macroeconomic model, the policy is neutral in real terms. In the present setting, however, real effects may occur in terms of factor migration.

The policy shock shifts the IS curve outwards from IS_0 to IS_1 in Panel (ii) of Figure 1. Aggregate demand in the commodity market shifts accordingly from AD_0 to AD_1 in Panel (i). The increase in demand induces the price level to rise along the vertical aggregate supply curve AS from p_0 to p_1 so

that the commodity market equilibrium shifts from E_0 to E_1 in Panel (i). The rise in prices implies that the LM curve shifts inwards from LM_0 to LM_1 thus causing the IS-LM equilibrium to shift from Σ_0 to Σ_1 . The nominal interest rate rises from r_0 to r_1 .

Real production remains unchanged at q_0 in both Panels (i) and (ii) of Figure 1 after the proper adjustment of all the relevant markets. The market adjustment can happen purely in nominal terms, which is the original idea of the classic interpretation, or in both nominal and real terms, in which case the latter mode is carried out by factor migration.

Start by examining the adjustment in the labour market in Panel (i) of Figure 1. The classical story is that the increase in commodity demand and the consequent rise in prices make the labour demand curve shift outwards from D^L_0 to D^L_1 . On impact, the perfectly foresighted people respond by reducing labour supply so that the labour supply curve shifts inwards from S^L_0 to S^L_1 . The labour market equilibrium shifts from e_0 to e_1 after the immediate adjustment of nominal wages from w_0 to w_1 . Employment remains at L_0 and production thus at q_0 so that real effects do not emerge in these conventional dimensions.

The above intuition is clear under perfect foresight (or rational expectations), but still it is worthwhile to examine the classical market mechanism closer. This is especially important in the present framework, where the market mechanism can work within the local markets and/or between the local markets.

Within the local markets, the market mechanism can work literally in two ways. First, the existing job contracts can be continuously updated in unanimous consultations between the employers and the employees. The nominal wages being instantly corrected in the contracts whenever changes in

prices occur, the result is a once for all vertical shift from e_0 to e_1 in Panel (i) of Figure 1. This is the common textbook type interpretation of the adjustment process.

Second, a more market oriented interpretation of the adjustment mechanism is that the job contracts are renewed within the local economy by quitting old jobs and taking new ones with up-to-date specifications. In terms of Figure 1 Panel (i) this means that as the price effect shifts the labour demand and labour supply curves to D^L_1 and S^L_1 , respectively, there emerges a momentary fall in the local real wage below ω^* and thus a momentary over-demand of labour. The over-demand is measured by the vertical difference of points e' and e'' at w_0 , of which the difference between e_0 and e'' measures the amount of quitted jobs. Upward adjustment in nominal wages is induced, and the new equilibrium, where all the quitters have been re-employed eventually sets to point e_1 at w_1 .

Under perfect factor mobility there is a third possibility for adjustment, because the workers can change their jobs also between the local economies. Whenever the perfectly foresighted workers see the momentary fall in their real wages below ω^* , they can react by quitting the old jobs and by taking new ones in the economy-wide labour market for the constant real wage ω^* . The idea can be seen in Panel (i) of Figure 1, where the local labour market adjusts to the initial shock by emigration until the local nominal wage rises to w_1 thus restoring ω^* in the local market. In technical terms, the local labour supply curve turns vertical between w_0 and w_1 , above which it shifts inwards in parallel form. The outcome is a kinked new labour supply curve $S^L S^L_2$. The labour market equilibrium shifts from e_0 to e_1 as before, which says that employment and production remain unchanged at L_0 and q_0 . Yet, there are real effects since emigration of labour force amounts to $L_1 - L_0$ read at w_1 .

Next, turn to the adjustment in the capital market in Panel (ii) of Figure 1. Here the third version of adjustment, namely adjustment between local economies, is even more obvious than in the labour

market. This is not only because capital is more mobile than labour, but also because there is considerable rigidity in the adjustment of the local supply of capital. This is because of the inter-temporal nature of the local capital supply: the local residents decide on their saving on this period, thus contributing to the local capital stock of the next period.

For simplicity, concentrate only on the market adjustment carried out by capital migration between the local economies. In Panel (ii) of Figure 1, the policy shock makes the nominal interest rate rise from r_0 to r_1 thus inducing the demand for capital to shift backwards from D^K_0 to D^K_1 . At p_0 this causes momentary over-supply of capital in local terms thus inducing the prices to rise, but it causes also a momentary surpass of the local real interest rate over the economy-wide rate ρ^* , thus attracting the perfectly mobile capital to flow in.

The local capital market adjusts to a new local equilibrium by the rise in the price level from p_0 to p_1 , and by the capital inflow $K_0 - K_1$, which is the horizontal difference between D^K_1 and S^K_0 at p_1 in Panel (ii) of Figure 1. The capital inflow turns the capital supply curve kinked, since the curve turns vertical between p_0 and p_1 and shifts horizontally outwards to S^K_1 above p_1 . The capital market equilibrium shifts from ε_0 to ε_1 . Local capital use remains at K_0 and real production at q_0 , but real effects still emerge in the form of capital reallocation.

4 Conclusions

The conventional wisdom concerning the effects of fiscal policy is that, in the longer run and around full employment, fiscal policy has no real effects in the economy. This paper shows that the conventional wisdom must be reconsidered when factor migration is taken into account.

The paper examines the effects of fiscal expansion in the classical regime of the Neo-Keynesian macroeconomic model under perfect factor mobility. In the model, fiscal policy does not affect the local use of labour and capital thus having no effects on production either. However, there may still be effects that are real in nature: fiscal policy clearly motivates geographical reallocation of the production factors. In particular, a positive policy shock induces labour to emigrate and capital to immigrate, and vice versa.

The result that fiscal expansion makes labour emigrate and capital immigrate may sound surprising, but it rests on sound intuition. The effect of the positive policy shock on prices and nominal interest rates makes the local real wage momentarily lower and the local real interest rate momentarily higher than those in the economy-wide markets. Thus it is quite obvious that the factors are attracted to migrate to the stated directions. Factor migration simply constitutes a re-equilibrating market adjustment mechanism that works between the local economies.

The effects of fiscal policy on factor migration are mitigated by the conventional within-locality alternatives for the market adjustment, which involve purely nominal terms. This is true especially in the labour market, where the nominal wages can adjust through employer-employee re-contracting of the existing job contracts and/or through the more market-like mechanism of workers' continuous search for better paying jobs.

Regardless of the assumption of perfect foresight, the within-locality modes of adjustment cause transaction costs to the workers in terms of both money and time. The re-contracting option necessitates monitoring, negotiating, enforcement and other such efforts, and the search option causes search costs the more the longer it takes for the local markets to adjust to the new equilibrium. Furthermore, regardless of the assumption of perfect mobility, inter-locality migration

surely causes transaction costs, too. The point is that the workers can substitute migration for local re-contracting and/or search when responding to the policy-induced changes in the market parameters. If the re-contracting and/or search costs within the local economy are too high as compared to the mobility costs, people rather move in the economy-wide labour market and take those jobs, in which the equilibrium real wage is straightforwardly available.

In the capital market adjustment by migration is a more obvious option than in the labour market. This is because the mobility costs of capital are reasonably lower than those of labour, while the local adjustment costs of capital are reasonably higher than in the labour market. The latter is because the rigidity of the inter-temporal supply of capital. Thus it is quite plausible that fiscal policy has real effects on capital migration.

One complication must be noted, though. The good mobility of capital is at least partially because of the fact that capital is unattached to its owner and its yields are transportable between the local economies. It may thus well be that it is the nominal interest rates rather than the real interest rates that explain the movements of capital. If that is the case, the present model is not able to provide unambiguous results.

To conclude, the real effects of fiscal policy depend on the mode of adjustment, which in turn depends on the relative costs of adjustment. Local contracting/search and migration substitute each other in individual behaviour and as market mechanisms. The aggregate effects on factor migration therefore depend on the relative transaction costs faced by the individual market agents. If the adjustment within the local economy is too costly as compared to the costs of migration, the real effects on migration become stronger and vice versa. The issue remains an empirical one.

Reading:

- Barro, R. and X. Sala-i-Martin (2004): *Economic Growth*. 2nd ed. Cambridge (Ma.): The MIT Press.
- Burda, M. and C. Wyplosz (1997): *Macroeconomics. A European Text*. Oxford: Oxford University Press.
- Fischer, S. (1976): Long Term Contracts, Rational Expectations, and the Optimal Money Supply Rule. *Journal of Political Economy*, 85:191-205.
- Fujita, M. and J-F. Thisse (2002): *Economics of Agglomeration. Cities, Industrial Location, and Regional Growth*. Cambridge: Cambridge University Press.
- Heijdra, B. and F. van der Ploeg (2002): *Foundations of Modern Macroeconomics*. Oxford: Oxford University Press.
- Krugman, P. and M. Obstfeld (2003): *International Economics. Theory and Policy*. 6th ed. Boston: Addison-Wesley.
- Laurila, H. (2006): A Note on the Two-Sector Model of Regional Factor Allocation. *Tampere Economic Working Papers, Net Series*, No. 38, October 2006.
- McCann, P. (2001): *Urban and Regional Economics*. Oxford: Oxford University Press.

Figure 1: The effects of fiscal expansion

