

Incorporating seasonality of labour markets in a general equilibrium framework

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Abstract

Amartya Sen noted that for “agriculture being a seasonal operation, it is somewhat misleading to speak in terms of a homogeneous unit of labour. A unit of labour at the time of harvesting is not replaceable by a unit of labour at a slack period” (Sen, 1966: 440). This insight is of particular interest for economic modellers as ignoring imperfect substitution of labour between seasons may yield misleading model outcomes. Computable general equilibrium (CGE) models are among the most common modelling frameworks used to gain an understanding of economy-wide implications of policy changes and other exogenous shocks. While CGE models allow for explicitly depicting behavioural relationships of economic agents and interdependencies of sectors and commodities, one of their weaknesses often is a relatively simplistic representation of labour markets (Dixon and Jorgenson, 2013). Due to data paucity, CGE models are usually solved on an annual basis and thus implicitly assume that there is total flexibility in allocating labour among periods within a year. Few studies have incorporated seasonal features within CGE model frameworks (Ferrari *et al.*, 2014; Robinson *et al.*, 2008; Dixon *et al.*, 2010), but according to the authors no study to date has tried to represent seasonality within the labour market.

Almost 80 % of the world’s labour force is employed in the developing world, where the largest share works in agriculture (World Bank, 2015). Labour demand in agriculture, particularly for the cultivation of crops, is dependent on the different periods of the growing season. Demand is highest during times of land preparation, sowing and harvest. During winter time, labour demand by agriculture typically reaches its lowest point. Given the important role of agriculture, its seasonal nature thus affects the largest group of the developing world’s labour force and represents “an inherent feature of rural livelihoods” (Ellis, 2000: 293). Furthermore, seasonality also plays a role for employment in non-farm sectors such as construction, forestry and tourism. There is ample empirical evidence for disequilibria of seasonal labour markets resulting in either seasonal unemployment or labour shortage (Lanjouw and Lanjouw, 2001; Kanwar, 2004; Zhang *et al.*, 2011). Besides the labour markets, seasonality can have wider reaching ramifications affecting inter alia migration decisions, temporal food shortage and liquidity constraints. This paper, yet, focuses on seasonal features of labour markets. The starting point of this research is the underlying hypothesis that policy analysis ignoring seasonal labour bottlenecks or unemployment results in misleading conclusions. The objective is to develop a generic model framework incorporating seasonal labour in order to test this hypothesis.

Bhutan was selected as a case study, where 60% of the labour force is employed in agriculture (NSB and ADB, 2012) and crop cycles are predominantly determined by monsoon rain. First, we present the model database, a modified 2012 social accounting matrix for Bhutan in which labour accounts are spatially disaggregated according to agroecological zone (AEZ) and temporally according to intra-annual time periods. Second, we integrate seasonality of labour into a single-country and comparative-static CGE model programmed in GAMS. The second step focuses on the adjustment of labour demand in the production nesting ensuring that there is no unrealistic substitution of seasonal labour across time periods. The methodological development is demonstrated by conducting a stylized scenario. An exogenous food price shock is simulated both using the model with and without incorporation of seasonality. The simulation illustrates how the incorporation of seasonal labour impacts model results. The paper concludes by highlighting further possible approaches and areas on how seasonality can be represented in general equilibrium models.

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