

Buy National and the Business Cycle*

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Abstract

By concentrating the stimulus on the domestic economy, Buy National clauses are argued to lead to higher fiscal multipliers. We show that this argument falls short. Although it is true that *domestic* demand for domestic goods is increased, at the same time *foreign* demand for domestic goods is reduced due to adverse changes in the real exchange rate. The two effects are of similar magnitude so that Buy National clauses do not lead to a stronger stimulus of GDP. Apart from that, restricting the stimulus to domestic products makes the stimulus more expensive, because cheap foreign products are ignored. Consequently, real public consumption is lowered by Buy National clauses.

Key words: Business cycle policy, Protectionism, Buy National

JEL classification: E13, E60, F11, F12, F13

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1 Introduction

When in 2008 the world economy was hit by its biggest crisis since World War II, and monetary policy reached its limits through the zero-lower-bound on nominal interest rates, countries all over the world resorted to fiscal government spending programmes to stimulate their economies. However, in today’s globalized world policy makers fear that the benefits of their fiscal programmes accrue to many countries, while the debt burden is borne solely by their own country. In response to these worries many countries, most notably the US and China, resorted to Buy National clauses, restricting their stimulus programmes to domestic products.¹ While at that time this led to a big outcry in the European Union, more recently the European Commission itself issued a proposal that would let the European Union close its public-procurement markets to firms from countries that exclude European competitors from their public contracts.² While academic research on the effects of government spending has mushroomed since 2008, Buy National clauses have been largely ignored. We try to close this gap.

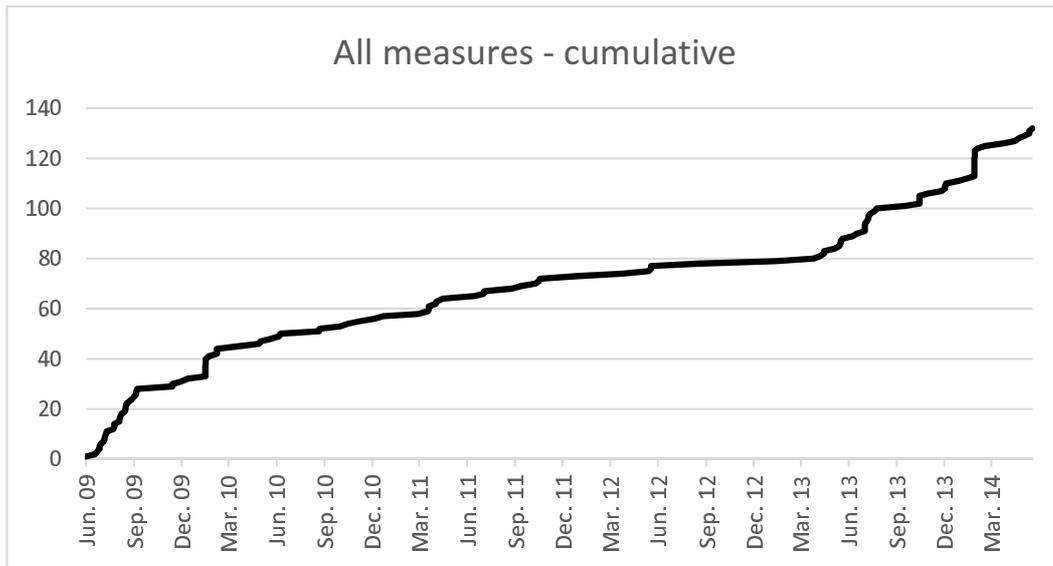


Figure 1: Cumulative number of restrictions to public procurements taken. Data source: <http://www.globaltradealert.org/>.

The tremendous increase in Buy National clauses is illustrated in figure 1,

¹For example, the US stimulus package from February 2009 required the government to buy only domestic iron, steel and other manufactured goods. The Chinese government had to buy products that contain “national indigenous innovation”, i.e., Chinese technology according to directive number 618 from November 2009. For a documentation of these two and other cases, see <http://www.globaltradealert.org>.

²See, e.g., the article “Unfree trade” in the *Economist* from March 24th, 2012.

showing the surge in restrictions to public procurements experienced in and after the recent financial crisis. Until March 2014, 132 measures were imposed that are likely to discriminate against foreign commerce in public procurements.³ Evenett (2010) documents that the lion’s share of these protectionist measures were implemented by OECD-countries. This increase is even more alarming if one keeps in mind that the public procurement market often accounts for as much as 18% of the total demand for goods and services of an economy (see European Commission, 2011, Table 3).⁴ The argument in favor of Buy National clauses is that they would increase the fiscal multiplier, because less of the stimulus is “lost” on foreign products. We provide a formal assessment of this argument and show that Buy National clauses are not a suitable instrument. They rather decrease the benefits of government spending stimuli.

To analyze the consequences of Buy National clauses, we extend the model of Ghironi and Melitz (2005) to include government spending, endogenous labor supply and distortionary labor taxation. In contrast to most models in international macro, our model features heterogeneous firms and endogenous market entry. This allows us to distinguish firm dynamics based on adjustments at the extensive margin, i.e., the number of firms, and the intensive margin, i.e., the size of firms. Recent empirical work reveals that the extensive margin is an important adjustment margin and that the intensive and extensive margins’ sensitivity to policy interventions such as trade liberalization is different.⁵ In line with these recent findings, we allow for adjustments along both margins.

We distinguish two kinds of government spending. General government spending consumes the same basket of goods as private households do and thus does not discriminate between domestic and foreign varieties.⁶ In contrast, Buy National consumes only domestic varieties. Comparing the effects of both government

³Many but not all of these 132 cases are Buy National clauses. But all of them favor domestic products for public procurements. If not by directly building in Buy National clauses, then by preference margins, by favoring state-owned firms for public procurement, or by restricting the public procurement to a specific domestic firm.

⁴For example, the share of the public sector in total demand amounts to about 10% for Estonia and to about 18% for the US. The import share in the public sector ranges from about 5% for the US to about 18% for Romania. This is lower than in the private sector, where the import share ranges from 7% for Japan to 29% for Estonia (see European Commission, 2011, Table 6). The lower import share in the public sector mainly results from the higher share of non-tradeable services absorbed in the public sector (like public administration, education, health and social work services). However, the import share has been rising more strongly in the public sector than in the private sector due to the increasing international fragmentation of the production chain.

⁵See, e.g., Chaney (2008), Ghironi and Melitz (2007), Helpman et al. (2008), and Bernard et al. (2007, 2009).

⁶This does not mean that the number of consumed foreign products equals the number of consumed domestic products. Restrictions to trade (iceberg trade costs and fixed costs of exporters) endogenously imply a home bias.

spending programmes reveals several important differences: i) General government spending increases imports (this is the mentioned spillover effect), while Buy National hardly does. ii) Consequently, domestic demand for domestic products goes up by more under Buy National. Thus, Buy National seems indeed to enhance the fiscal multiplier. However, there are also price effects, which seem to have been ignored in the public debate: iii) Buy National leads to an appreciation of the real exchange rate while general government spending leads to a depreciation of the real exchange rate. In consequence, exports go down under Buy National while they go up under general government spending. This effect is of approximately equal magnitude as the increase in domestic demand, so that the effect on GDP is about the same for both types of government spending.⁷ iv) Buy National is more expensive since it ignores cheap foreign products, decreasing the (real) consumption of the government.

In the macroeconomic literature the recent financial crisis has initiated new interest in the effects of government spending. However, this research mainly discusses whether the fiscal multiplier of government spending is larger or smaller than one. For example, Uhlig (2010), using an RBC model, finds a multiplier smaller than one. Cogan et al. (2010) compare various models and find large multipliers only for models with backwards looking agents. Christiano et al. (2011) and Coenen et al. (2012) find larger multipliers when the zero lower-bound of interest rates is hit. Auerbach and Gorodnichenko (2012) show that the multiplier is higher during recessionary periods. Monacelli and Perotti (2010) use an open economy model to analyze the trade effects of general government spending. None of these papers considers Buy National.

Another related debate concerns fiscal devaluations, i.e., the possibility to mimic a nominal exchange rate depreciation with unilateral fiscal mechanisms. This debate re-gained momentum with the economic problems in the southern euro-area countries which could no longer resort to nominal exchange rate devaluations to push up their competitiveness. Fahri et al. (2014) show that a nominal exchange rate devaluation can be mimicked by an increase in the value-added tax and a decrease in the payroll tax. This makes domestic products cheaper relative to foreign products and thus stimulates output. Specifically in regimes with nominal rigidities for wages and exchange rates, changes in the tax system are therefore alternative fiscal instruments to re-establish international competitiveness by creating a real devaluation of national products. In a way the idea behind Buy National is similar. The government tries to favor domestic products over foreign products. Note, however, that Buy National pushes up domestic prices relative to foreign prices, i.e., relative international prices move in the exact opposite direction under Buy National than under a fiscal devaluation. We show in our framework that Buy National therefore leads to a smaller stimulus

⁷In fact, in each of our simulations the effects of general government spending are more beneficial, but the difference is very small.

for the economy than general government spending.

Most closely related to our paper is Larch and Lechthaler (2011), who show that a temporary increase in trade barriers as a response to an economic downturn does not increase GDP. However, their analysis is restricted to non-tariff trade barriers, while government spending is not modeled at all. A related paper which is more in the tradition of public finance is Larch and Lechthaler (2013). They model Buy National and general government spending in a static trade model with homogeneous firms in order to show that the socially optimal level of Buy National is higher than the socially optimal level of Buy International. They do not allow for trade imbalances and since their framework is static they cannot analyze business cycle dynamics which lie at the focus of this paper.

2 A Dynamic Trade Model with Government Spending

In this section we describe our model framework which extends the Ghironi and Melitz (2005) model in several ways. While in Ghironi and Melitz (2005) the labor input is given exogenously, we endogenize it to allow for distortionary taxation. We also introduce government spending, which can be general, consuming the same mix of domestic and foreign varieties as consumers, or Buy National, consuming only domestic varieties.

The model by Ghironi and Melitz (2005) is based on Melitz (2003), the now most widely used theoretical model among trade economists. Its popularity stems from the combination of being able to capture important stylized facts (like the fact that only very productive firms export, that exporters are bigger and employ more workers than firms selling only domestically, and that small firms with low productivity are driven out of the market after trade liberalization), while still remaining very tractable. See the empirical studies by Dunne et al. (1989), Davis and Haltiwanger (1992), Bernard and Jensen (1995, 1999, 2004), Roberts and Tybout (1997), Clerides et al. (1998), and Bartelsman and Doms (2000) for evidence concerning the stylized facts.

2.1 Households

We assume two countries, labeled home and foreign. In the steady-state the two countries are symmetric but we allow for differences in policy out of the steady-state. Foreign variables are denoted by an asterisk in superscript. In the following we only describe the equations for the home country, equivalent equations hold for the foreign country.

The representative household gains utility from consuming the aggregate consumption good C and suffers disutility from labor L . It has a standard utility function of the form

$$U_t = E_t \left[\sum_{s=t}^{\infty} \beta^{s-t} \left(\frac{C_s^{1-\gamma}}{(1-\gamma)} - \frac{L_s^{1+\phi}}{(1+\phi)} \right) \right], \quad (1)$$

where β is the subjective discount factor, γ is the inverse of the intertemporal elasticity of substitution and ϕ is the inverse of the Frisch-elasticity of labor supply. The household seeks to maximize its utility subject to the budget constraint

$$B_{t+1} + Q_t B_{*,t+1} + \frac{\eta}{2}(B_{t+1} - \bar{B})^2 + \frac{\eta}{2}Q_t(B_{*,t+1} - \bar{B}_*)^2 + \tilde{v}_t N_{H,t} x_{t+1} + C_t = \\ (1 + r_t)B_t + Q_t(1 + r_t^*)B_{*,t} + (\tilde{d}_t + \tilde{v}_t)N_{D,t}x_t + T_t^f + (1 - \chi_t)w_t L_t - T_t, \quad (2)$$

where $Q_t \equiv \varepsilon_t P_t^*/P_t$ is the consumption-based real exchange rate, i.e., units of home consumption per unit of foreign consumption, where ε_t is the nominal exchange rate (units of home currency per unit of foreign currency) and P_t and P_t^* denote the consumption-based price index for the home and foreign economy, respectively. The domestic household invests in domestic and foreign bonds, where the latter are denoted by an subscript asterisk, i.e., B and B_* respectively. It buys x shares in a mutual fund of $N_{H,t} = N_{D,t} + N_{E,t}$ home firms (those already operating at time t , $N_{D,t}$, and the new entrants, $N_{E,t}$) at a price \tilde{v} . Bonds earn a risk-free interest rate (r and r^*), while private firms pay a dividend \tilde{d} . Note, however that the number of firms diminishes from one period to the other due to an exogenous risk of firm breakdown: $N_{D,t+1} = (1 - \delta)N_{H,t}$. To assure that temporary shocks do not have permanent consequences and that the trade balance is always zero in the steady-state, we assume quadratic adjustment costs in the holding of bonds, which depend on the parameter η (for more details see Ghironi, 2006). These fees are then rebated to the households (T^f), who take the rebate as given exogenously. We assume that in steady-state, no bonds are held, i.e., $\bar{B} = \bar{B}_* = 0$. Finally, the household earns a real wage $w = W/P$, with W denoting the nominal wage. A share χ of the wage income goes as labor-tax to the government. This distorts the endogenous labor supply. Additionally the household (potentially) has to pay lump-sum taxes T . All values are denoted in real terms.

Maximizing the utility function (1) with respect to the budget constraint (2) yields four first order conditions: one Euler equation for share holdings

$$\tilde{v}_t = \beta(1 - \delta)E_t \left[\left(\frac{C_{t+1}}{C_t} \right)^{-\gamma} (\tilde{v}_{t+1} + \tilde{d}_{t+1}) \right], \quad (3)$$

two Euler equations for bond holdings

$$(C_t)^{-\gamma} (1 + \eta B_{t+1}) = \beta(1 + r_{t+1}) E_t[(C_{t+1})^{-\gamma}], \quad (4)$$

$$(C_t)^{-\gamma} (1 + \eta B_{*,t+1}) = \beta(1 + r_{t+1}^*) E_t \left[\frac{Q_{t+1}}{Q_t} (C_{t+1})^{-\gamma} \right], \quad (5)$$

and the labor supply curve

$$L_t^\phi = C_t^{-\gamma} (1 - \chi_t) w_t. \quad (6)$$

The aggregate consumption good is defined over a continuum of goods Ω including both domestic and foreign varieties: $C_t = \left(\int_{\omega \in \Omega} c_t(\omega)^{(\theta-1)/\theta} d\omega \right)^{\theta/(\theta-1)}$, where $\theta > 1$ is the elasticity of substitution across goods. Each variety is produced by a single firm and sold under monopolistic competition. Since the number of firms is endogenous, the number of varieties is also endogenous and, thus, can change from one period to the other. The government expands $P \times g$ on the exact same varieties as the households and $P_q \times q$ on domestic varieties.⁸ Since general government spending consists of the exact same bundle of varieties as the private consumption good, the same price index, P , also applies for g . In contrast, Buy National only consumes domestic varieties and thus a different price index, P_q applies. Let $p_{D,t}(\omega)$ and $p_{X,t}^*(\omega)$ denote the domestic price of domestically produced and imported goods, respectively. It follows that the domestic demand for domestic and foreign products is given by

$$c_{D,t}(\omega) = (p_{D,t}(\omega)/P_t)^{-\theta} (C_t + g_t + P_{q,t}/P_t q_t), \quad (7)$$

$$c_{X,t}(\omega) = (p_{X,t}^*(\omega)/P_t)^{-\theta} (C_t + g_t). \quad (8)$$

2.2 Firms

2.2.1 Production, Pricing, and the Export Decision

In each country there is a continuum of firms producing a different variety $\omega \in \Omega$. Labor is the only factor of production. The productivity of a firm depends on an aggregate component Z and an idiosyncratic component z , which, following Melitz (2003), is heterogeneous among firms. Hence, the unit costs of production are $w_t/(Zz)$.

Before entering the market, firms have to pay sunk entry costs f_E , measured in terms of effective labor units, i.e., the sunk entry costs equal $w_t f_E/Z$. After payment of the sunk entry costs, firms draw their productivity level z from

⁸See Lewis (2009) for more details on how to model government spending in a model with endogenous firm entry.

a common distribution $G(z)$ with support $[z_{\min}, \infty)$. The idiosyncratic productivity stays constant thereafter. In contrast to Melitz (2003) there are no fixed production costs. Every firm may be hit by a “death” shock, which occurs with probability δ each period. It is assumed that this exit-inducing shock is independent of the firm’s productivity level, so $G(z)$ also represents the productivity distribution of all producing firms.

Besides serving the domestic market, a firm may export. Exporting involves variable iceberg trade costs $\tau_t^* \geq 1$ as well as period-by-period fixed costs f_X (measured in units of effective labor).

Given the demand function with constant elasticity θ and monopolistic competition, optimal pricing behavior of all firms is given by a constant markup $\theta/(\theta - 1)$ over marginal costs. Variety-prices in units of the price index in the destination market are then given by

$$\rho_{D,t}(z) \equiv \frac{p_{D,t}(z)}{P_t} = \frac{\theta}{\theta - 1} \frac{w_t}{Zz}, \quad \rho_{X,t}(z) \equiv \frac{p_{X,t}(z)}{P_t^*} = Q_t^{-1} \tau_t^* \rho_{D,t}(z). \quad (9)$$

Due to the fixed export costs, firms with low productivity levels z may decide not to export. Total profits $d_t(z)$ are distributed to households as dividends and given by $d_t(z) = d_{D,t}(z) + d_{X,t}(z)$, where

$$d_{D,t}(z) = \frac{1}{\theta} [\rho_{D,t}(z)]^{1-\theta} (C_t + g_t + P_{q,t}/P_t q_t), \quad (10)$$

$$d_{X,t}(z) = \begin{cases} \frac{Q_t}{\theta} [\rho_{X,t}(z)]^{1-\theta} (C_t^* + g_t^*) - \frac{w_t f_X}{Z} & \text{if firm } z \text{ exports,} \\ 0 & \text{otherwise.} \end{cases} \quad (11)$$

As in Melitz (2003), more productive firms earn higher profits and set lower prices (see equation (9)). A firm will export when productivity z is above a cutoff level $z_{X,t} = \inf\{z : d_{X,t}(z) > 0\}$. The lower bound productivity z_{\min} is assumed to be low enough relative to the export costs so that $z_{X,t}$ is above z_{\min} . This ensures that firms with productivity levels between z_{\min} and $z_{X,t}$ decide not to export. Note that this set of firms as well as $z_{X,t}$ can fluctuate over time with changes in the profitability of the export market.

2.2.2 Firm Averages

As noted above, only firms with productivity above $z_{X,t}$ export. This implies that the number of exporting firms is given by $N_{X,t} = [1 - G(z_{X,t})]N_{D,t}$. Following Melitz (2003), an average productivity level for all producing firms, \tilde{z}_D , and for all exporters, $\tilde{z}_{X,t}$, can be defined

$$\tilde{z}_D \equiv \left[\int_{z_{\min}}^{\infty} z^{\theta-1} dG(z) \right]^{\frac{1}{\theta-1}}, \quad \tilde{z}_{X,t} \equiv \left[\frac{1}{1 - G(z_{X,t})} \int_{z_{X,t}}^{\infty} z^{\theta-1} dG(z) \right]^{\frac{1}{\theta-1}}. \quad (12)$$

These definitions of average productivities summarize the heterogeneity of firms so that the model can be interpreted as one where N_D firms with productivity level \tilde{z}_D produce for the home market and N_X firms with productivity level \tilde{z}_X export to the foreign market.

Applying these average productivities, the average nominal price of domestic firms in their domestic market can be written as $\tilde{p}_D \equiv p_D(\tilde{z}_D)$. Similarly, $\tilde{p}_X \equiv p_X(\tilde{z}_X)$ represents the average nominal price of domestic exporters in the foreign market. Using these prices, we can write the home price index as $P_t = [N_{D,t}(\tilde{p}_{D,t})^{1-\theta} + N_{X,t}^*(\tilde{p}_{X,t}^*)^{1-\theta}]^{1/(1-\theta)}$, which is equivalent to

$$[N_{D,t}(\tilde{\rho}_{D,t})^{1-\theta} + N_{X,t}^*(\tilde{\rho}_{X,t}^*)^{1-\theta}]^{1/(1-\theta)} = 1. \quad (13)$$

The price index for domestic varieties is $P_{q,t} = [N_{D,t}(\tilde{p}_{D,t})^{1-\theta}]^{1/(1-\theta)}$ which yields

$$\rho_{q,t} \equiv P_{q,t}/P_t = [N_{D,t}(\tilde{\rho}_{D,t})^{1-\theta}]^{1/(1-\theta)}. \quad (14)$$

The definitions of the average productivities also allow us to write average total profits as $\tilde{d}_t \equiv \tilde{d}_{D,t} + [1 - G(z_{X,t})]\tilde{d}_{X,t}$, where $\tilde{d}_{D,t} \equiv d_{D,t}(\tilde{z}_D)$ ($\tilde{d}_{X,t} \equiv d_{X,t}(\tilde{z}_{X,t})$) denotes average profits earned from domestic (export) sales.

2.2.3 Firm Entry and Exit

There is an unbounded mass of perfectly forward looking entrants in every period, which start producing the period after they enter the market. Whether or not to enter the market depends on the present discounted value of their expected stream of profits $\{\tilde{d}_s\}_{s=t+1}^{\infty}$

$$\tilde{v}_t = E_t \sum_{s=t+1}^{\infty} [\beta(1-\delta)]^{s-t} \left(\frac{C_s}{C_t}\right)^{-\gamma} \tilde{d}_s. \quad (15)$$

The discount rate of firms is given by the household's stochastic discount factor adjusted for the probability of firm survival $1 - \delta$. Assuming that there is a positive number of entrants in every period, free entry of firms implies that in equilibrium the average firm value equals the entry costs, i.e., $\tilde{v}_t = w_t f_E/Z$. The assumptions of firm entry and exit imply that the number of producing firms in period t is given by $N_{D,t} = (1 - \delta)(N_{D,t-1} + N_{E,t-1})$.

2.3 The Government Sector

The government earns income through the tax on labor income and, potentially, a lump-sum tax. Its consumption is distinguished between general government

spending g and Buy National q . General government spending consumes the exact same varieties as private households consume, i.e., general government spending also includes foreign varieties. In contrast, Buy National only consumes domestic varieties. We assume that the government always has a balanced budget and thus, the budget constraint reads

$$T_t + \chi_t w_t L_t = g_t + q_t \rho_{q,t}. \quad (16)$$

In our numerical simulations we will distinguish two scenarios. One in which additional expenses are financed via the lump sum tax and one in which additional expenses are financed via the distortionary labor tax.

2.4 Aggregation and Labor Market Clearing

In equilibrium home and foreign bonds must be in zero net supply worldwide. Remembering that B_{t+1} and $B_{*,t+1}$ denotes holdings of the home household of home and foreign bonds, respectively, and similarly B_{t+1}^* and $B_{*,t+1}^*$ denotes holdings of the foreign household of foreign and own bonds, respectively, it has to hold that $B_{t+1} + B_{t+1}^* = B_{*,t+1} + B_{*,t+1}^* = 0$. Further, all shares must be held in every period by the representative household, i.e., $x_{t+1} = x_t = 1$. Taking these equilibrium conditions into account and aggregating the budget constraint (2) across all households yields the aggregate accounting equation

$$B_{t+1} + Q_t B_{*,t+1} = (1 + r_t) B_t + Q_t (1 + r_t^*) B_{*,t} + (1 - \chi_t) w_t L + N_{D,t} \tilde{d}_t - T_t - N_{E,t} \tilde{v}_t - C_t. \quad (17)$$

This condition shows that in equilibrium, the markets for home and foreign bonds clear, and each country's net foreign assets entering period $t + 1$ depend on interest income from asset holdings entering period t , labor income, net investment income, and consumption during period t . The change in asset holdings between t and $t + 1$ is the country's current account. A similar equation holds abroad

$$\frac{B_{t+1}^*}{Q_t} + B_{*,t+1}^* = \frac{(1 + r_t)}{Q_t} B_t^* + Q_t (1 + r_t^*) B_{*,t}^* + (1 - \chi_t^*) w_t^* L^* + N_{D,t}^* \tilde{d}_t^* - T_t^* - N_{E,t}^* \tilde{v}_t^* - C_t^*. \quad (18)$$

Multiplying (18) with Q_t , the real exchange rate, and subtracting the resulting equation from (17) yields an expression for home net foreign asset accumulation as a function of interest income and of the cross-country differentials between labor income, net investment income, and consumption

$$B_{t+1} + Q_t B_{*,t+1} = (1 + r_t) B_t + Q_t (1 + r_t^*) B_{*,t} + \frac{1}{2} ((1 - \chi_t) w_t L - Q_t (1 - \chi_t^*) w_t^* L^*) + \frac{1}{2} (N_{D,t} \tilde{d}_t - N_{D,t}^* Q_t \tilde{d}_t^*) - \frac{1}{2} (T_t - Q_t T_t^*) - \frac{1}{2} (N_{E,t} \tilde{v}_t - N_{E,t}^* Q_t \tilde{v}_t^*) - \frac{1}{2} (C_t - Q_t C_t^*). \quad (19)$$

To close the model, we have to impose labor market clearing

$$L_t = \frac{\theta - 1}{w_t} (N_{D,t} \tilde{d}_{D,t} + N_{X,t} \tilde{d}_{X,t}) + \frac{1}{Z} (\theta N_{X,t} f_X + N_{E,t} f_E). \quad (20)$$

3 Calibration

3.1 Parametrization of Productivity Draws

For our numerical simulation we have to parameterize the productivity distribution. We follow the literature and assume that productivity z is distributed Pareto with lower bound z_{\min} and shape parameter $k > \theta - 1$: $G(z) = 1 - (z_{\min}/z)^k$. We can define $v \equiv \{k/[k - (\theta - 1)]\}^{1/(\theta - 1)}$ such that average productivities \tilde{z}_D and $\tilde{z}_{X,t}$ can be written as $\tilde{z}_D = v z_{\min}$ and $\tilde{z}_{X,t} = v z_{X,t}$. Then the share of home-exporting firms can be expressed as $N_{X,t}/N_{D,t} = 1 - G(z_{X,t}) = (v z_{\min}/\tilde{z}_{X,t})^k$. Average export profits satisfy $\tilde{d}_{X,t} = (\theta - 1)(v^{\theta - 1}/k)w_t f_X/Z$, which follows from taking into account the zero export profit condition $d_{X,t}(z_{X,t}) = 0$. Similar relationships hold for the foreign country.

3.2 Parametrization of Preferences and Costs

Every period represents a quarter, the discount factor β is set equal to 0.99 and γ , the inverse of the intertemporal elasticity of substitution, is set to 2. δ , the exogenous firm exit shock, is set equal to 0.025, which matches the U.S. empirical level of 10 percent job destruction per year. θ , the elasticity of substitution across varieties, is set equal to 3.8 following Bernard et al. (2003). They also report that the standard deviation of log U.S. plant sales is 1.67. As in the given model this standard deviation is equal to $1/(k - \theta + 1)$, the choice of $\theta = 3.8$ implies that $k = 3.4$. Consistently with Obstfeld and Rogoff (2001) we set the steady-state value of trade costs $\bar{\tau}$ equal to 1.3.

The steady-state fixed export costs f_X is set to 10.9 percent of the per-period, amortized flow value of the entry costs, $[1 - \beta(1 - \delta)]/[\beta(1 - \delta)]f_E$, such that the proportion of exporting firms matches the 21 percent reported in Bernard et al. (2003). We set the scale parameter for the bond adjustment costs to $\eta = 0.0025$, which is enough to generate stationarity in response to transitory shocks but small enough to avoid overstating the role of this friction in determining the dynamics of the model.

Entry costs f_E are set to 1 without loss of generality, as changing f_E while maintaining the ratio f_X/f_E does not affect any of the impulse responses. For similar reasons, we normalize z_{\min} to 1. The inverse of the Frisch-elasticity of labor supply ϕ is set to the standard value 1 (see Gali, 2008).

3.3 Parametrization of the Government Sector

Following Trabandt and Uhlig (2011), we set the ratio of government spending to GDP to 18%. We assume that in steady-state all government spending is general, i.e., Buy National is only used temporarily, as a business cycle instrument. Lump sum taxes are set to zero. Labor taxes are set in such a way that the government budget is balanced. This yields a labor tax rate of 18%.

When we simulate the temporary change in general government spending or Buy National, we assume that on impact the change in the policy instrument costs the equivalent of one percent of steady-state GDP. In each case, we assume that the policy instrument jumps during the first period and then slowly converges back to its steady-state value. Following Lewis (2009) and Devereux et al. (1996) we assume that the coefficient of autocorrelation is 0.973.

4 Buy National and the Business Cycle

In this section we analyze the consequences of Buy National and general government spending for the business cycle. In each case we assume that the policy instrument jumps up in the first period and then slowly converges back to its steady-state value (for more details see the previous paragraph). To get familiar with the mechanisms of the model it is useful to start off with a discussion of general government spending, i.e., an increase in government spending that does not discriminate between foreign and domestic products. In order to avoid mixing up the effects of the instrument and the effects of financing the instrument, we start by assuming that the lump sum tax adjusts to assure that the government budget is balanced at any time. Later we will release this assumption and assume instead that the labor tax has to adjust to balance the government budget. Since the focus of our analysis is the evaluation of a policy instrument, we report welfare-based variables.

4.1 General Government Spending

The effects of a temporary increase in government spending are illustrated in figure 2. As common in business-cycle models with forward looking agents (see, e.g., Uhlig, 2010), government spending makes private households poorer because taxes have to be increased.⁹ This crowds out private consumption but increases

⁹In our model Ricardian equivalence holds, so the exact timing of lump sum tax payments does not matter. Thus, allowing for temporarily unbalanced government budgets would not alter the results.

output, because households are willing to provide more labor.¹⁰ Due to the reduction of private consumption the multiplier is smaller than one.¹¹

The increase in demand does not only increase production for the domestic market but also imports, since the government consumes both domestic and foreign varieties. This induces the real exchange rate to depreciate, meaning that domestic prices decline relative to foreign prices, which stimulates exports. The trade balance turns negative. Since one country cannot permanently build up debt towards other countries, the trade balance has to turn positive eventually, in order to pay back the debt. Note, however, that the movements in the trade balance are smaller than the movements in imports and exports. The reason is that imports and exports move in the same direction, offsetting each others impact on the trade balance to a large extent.

Due to the increase in the production for the domestic market and exports, firm's profits go up, which induces more firms to enter the market. Thus, the number of firms increases, reaches a peak after 16 periods and then slowly converges back to its steady-state level. This is very well in line with the empirical evidence presented in Lewis (2009).¹²

Figure 2 also demonstrates the spillover effects discussed in the introduction: GDP does not only increase in the domestic country but also in the foreign country. Nevertheless, on impact foreign consumption goes down. The reason for this is that the demand from the home country jumps up immediately, while it takes some time to build up further production capacities. Thus, foreign consumers consume less to be able to satisfy the increased import demand from the home country. However, in later periods foreign consumers can benefit from their savings and enjoy consumption above steady-state for a prolonged period of time.

Thus, our model partly confirms the concerns of policy makers and the public discussed in the introduction. Foreign countries benefit from the fiscal stimulus,

¹⁰An interesting feature of this model is the fact that output can temporarily increase even without an increase in labor supply. The reason is that the model allows adjustments via the intensive and extensive margin. Under an exogenous labor supply, a decrease in the investment in new firms (the extensive margin) sets free resources to produce more of existing varieties (the intensive margin). While this tends to decrease welfare in the long-run, it allows to temporarily increase production in the short-run.

¹¹The crowding out of private consumption is a common result in RBC-models that is at odds with the empirical literature, which typically finds that government spending increases private consumption (see, e.g, Gali et al., 2007). There are several possible solutions to this problem, like assuming a share of rule-of-thumb consumers or non-separable preferences. However, these solutions only work in models with nominal rigidities. Since the crowding out of consumption is not central to our results and sticky prices involve a much more complicated model, we leave this extension for future research.

¹²Note, however, that, as in Lewis (2009), this crucially depends on the persistence of the government spending shock. If the persistence is decreased then the number of firms drops in response to an increase in government spending. All other results are unaffected, though.

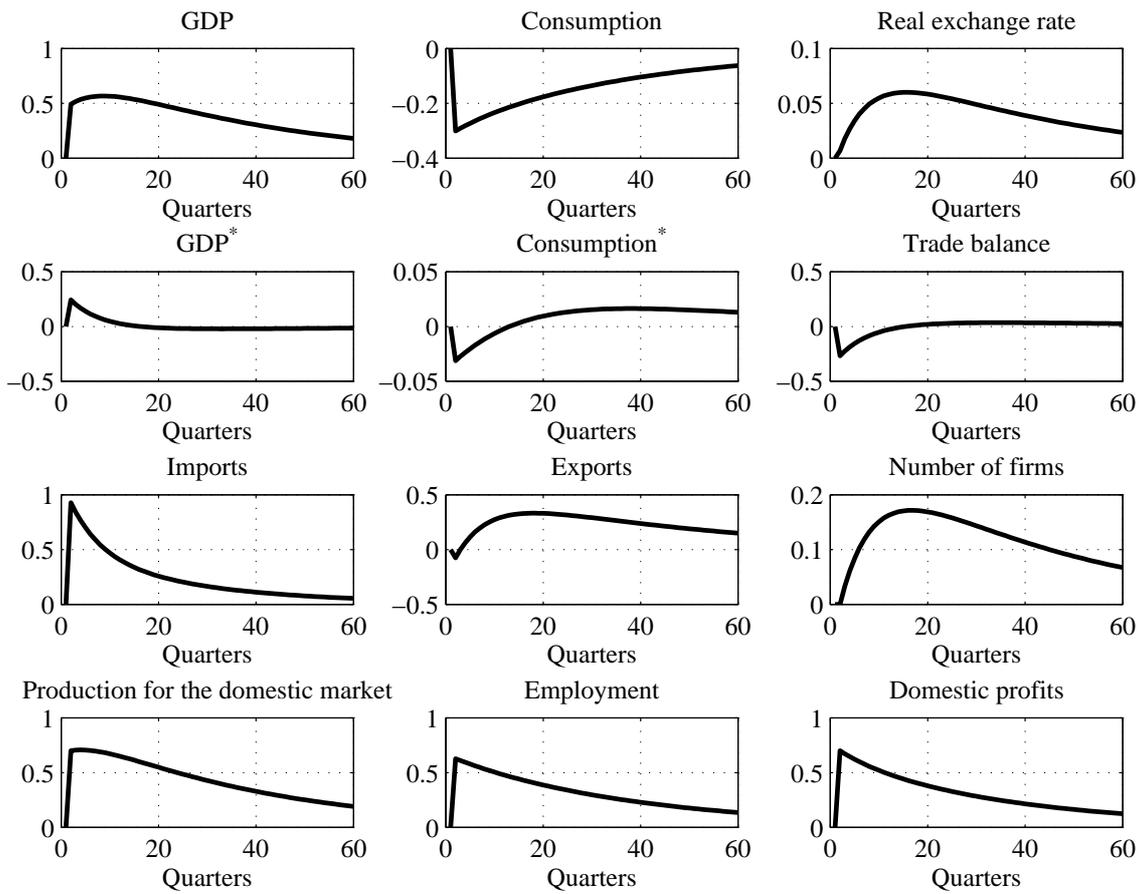


Figure 2: General government spending

as some of the money spent goes to foreign firms and imports go up. However, this is only part of the story. At the same time the real exchange rate depreciates, which helps exports to increase. In this way the fiscal stimulus indirectly helps exporters, the firms with the highest productivity. This effect, which clearly increases GDP, is largely ignored in the public debate.

4.2 Buy National versus General Government Spending

How do the effects of government spending change if the stimulus is directed towards domestic varieties and ignores foreign varieties? One might expect that this increases the fiscal multiplier (for the domestic country) because less of the stimulus is “lost” on foreign products.

Figure 3 compares the effects of general government spending and Buy National. The effect on production for the domestic market is as expected. Buy National increases production for the domestic market by more than general government spending but the effect is small. The reason is that the crowding out of consumption is increased because a stimulus concentrated on domestic varieties has a larger impact on the price of domestic varieties. Nevertheless, production for the domestic market increases by more. So if the only goal is to increase production for the domestic market, Buy National is a suitable instrument.

However, there are also effects on trade. Most importantly, under Buy National the real exchange rate appreciates, while it depreciates under general government spending. As a consequence, Buy National decreases exports while they increase in response to general government spending.

Thus, Buy National has two distinct and counteracting effects on GDP as compared to general government spending. On the one hand, production for the domestic market is stimulated more. On the other hand, production for the export market is dampened. To further highlight the two effects, the upper panel of figure 4 compares the output effects under two different scenarios. The upper-right panel shows GDP under the assumption that exports are not affected by government spending. In this way the effects of the change in the real exchange rate can be shut off. The upper-left panel shows GDP when both effects are at work. It can be seen that the real-exchange-rate-effect considerably reduces the effects of Buy National, so that in the end Buy National is not better than general government spending.

Notable is also the effect on the trading partner. Both general government spending and Buy National increase GDP in early periods and decrease it in later ones, whereas private consumption decreases first and later increases. For both variables, general government spending is more beneficial than Buy National, i.e., the increases are larger and the decreases are smaller. This is not surprising, given that Buy National is designed to reduce spillovers. At least at this margin

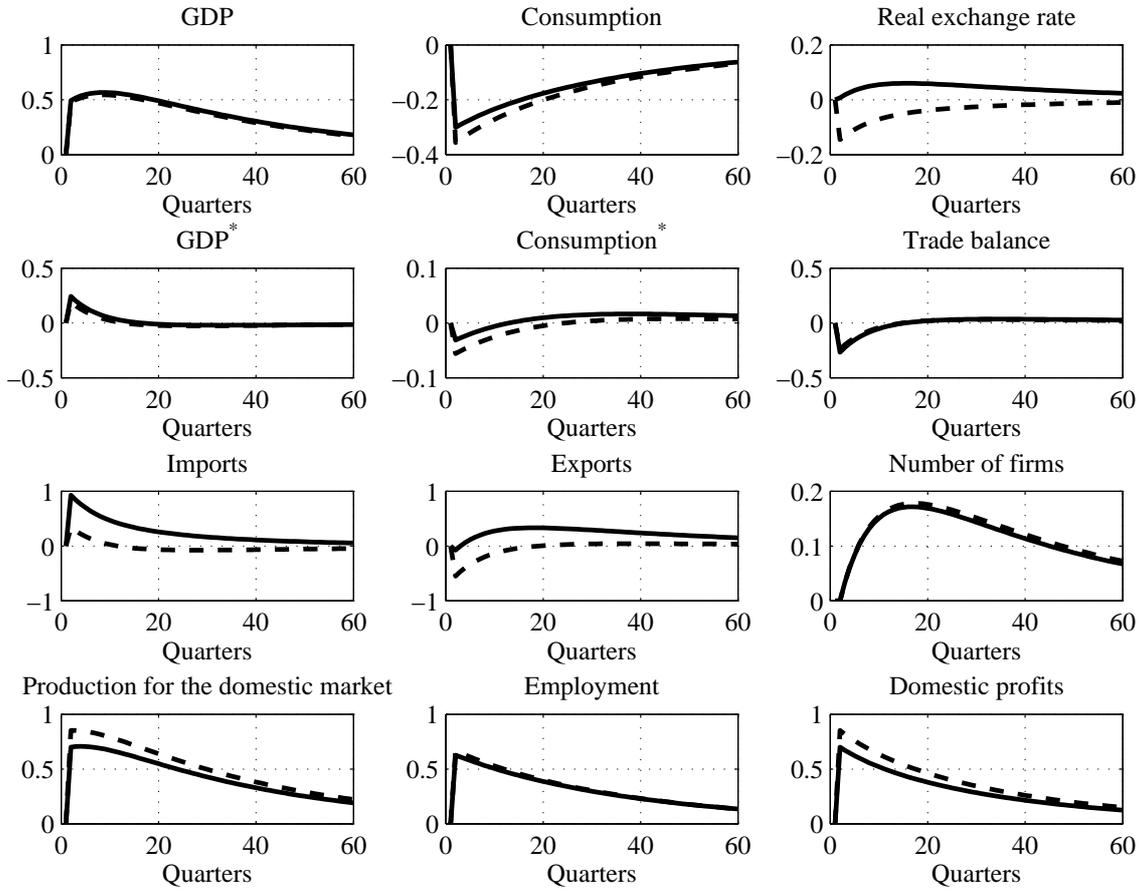


Figure 3: General government spending (solid line) versus Buy National (dashed line)

the policy succeeds, although the effect is not very large.

To sum up: Although Buy National has a larger impact on production for the domestic market, these gains are fully offset by the adverse effects on exports. Protectionism in the form of a Buy National clause does not make any country better off. Note that this argument does not rely on any kind of retaliation (which would only make matters worse).

Why then are these measures still so popular? One answer to this question might be that there are still some special interest groups which gain from this kind of policy. In our model, it is the group of firms serving only the domestic market whose profits are increased by Buy National and which, therefore, has an incentive to lobby for this kind of policy.

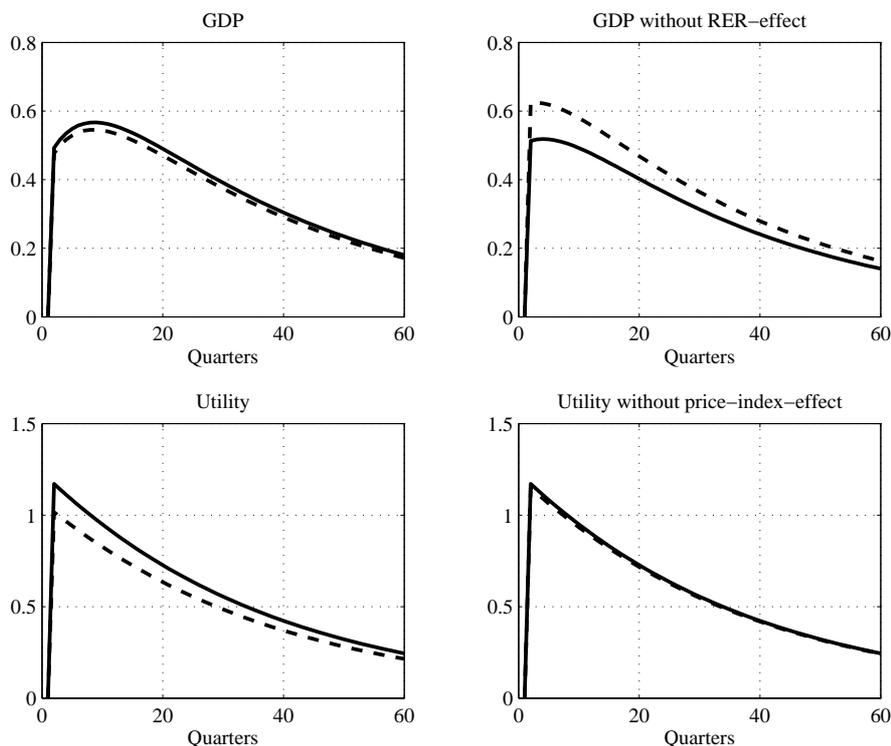


Figure 4: GDP and utility under general government spending (solid line) versus Buy National (dashed line)

4.3 The Price-Index-Effect

So far we have concentrated our analysis on the effects on GDP and its components. However, this ignores an additional adverse effect of Buy National, namely that the restriction on domestic varieties makes the stimulus package more expensive. For the effects on GDP this is irrelevant, if the government expands the same amount of money in both cases. However, Buy National implies a lower level of real public consumption because fewer products can be bought. This can be seen by comparing the consumption-based price index, 13 (which is also the price index for general government spending), and the price index of domestic products 14. Because Buy National ignores foreign products, its price index is higher than the consumption-based price index.

To highlight this point we follow Linnemann and Schabert (2012) and assume that government spending yields utility to private households of the form $\kappa \times \log(g_t + q_t)$. In line with Linnemann and Schabert (2012) we set $\kappa = 0.3278$. The lower panel of figure 4 shows how general government spending and Buy National affect households' utility. The lower-right panel shows the (counterfactual) effects on utility if there were no differences in price indices. Again, the differences

between both cases are very small. However, the correct comparison is shown in the lower-left panel where the correct price index is used for Buy National. It can be seen that now Buy National yields lower utility than general government spending.

Thus, Buy National does not only fail to deliver a stronger impulse on domestic GDP, it actually leads to lower welfare. The discrimination of foreign products makes government spending more expensive and, thus, leads to an inefficient allocation of resources. Fewer products can be bought and welfare is lower. Hence, even ignoring the fact that Buy National hurts one's trading partners, Buy National leads to a lower level of GDP and utility as compared to the same amount of general government spending.

5 Alternative Scenarios

5.1 Free Trade Scenario

For our baseline scenario we have assumed that the share of exporting firms is 21%. This choice is motivated by empirical evidence on the US-economy. However, one might think that this relatively low share of exporting firms is responsible for the weak effects of Buy National. Therefore, and because it also helps to better understand some implications of government spending, we repeat the exercise for the most extreme case: an economy in which there are no obstacles to international trade whatsoever, i.e., trade costs and fixed costs of exporting are set to zero. This implies that all firms export, i.e., the share of exporting firms is 100%, that one half of GDP is exported and that one half of aggregate consumption is imported.

Figure 5 illustrates the results. It can be seen that qualitatively nothing changes and even quantitatively the differences are very small. Compared with the costly trade scenario, the free trade scenario leads to a slightly lower effect of government spending on domestic GDP and a stronger effect on foreign GDP. In a way, this confirms the worries stated in the introduction that the benefits of government spending spill over to one's trading partners, but note that the effects are very small. The reason is that under general government spending some benefits go back to the domestic country through increased export demand. Thus, through the real-exchange-rate-effect general government spending already puts more emphasis on stimulating domestic production than on stimulating foreign production. In other words, there is no need to concentrate the stimulus on domestic varieties since the adjustment of the real exchange rate assures that this happens automatically even if the stimulus does not discriminate between domestic and foreign varieties. In contrast, explicitly concentrating the stimulus

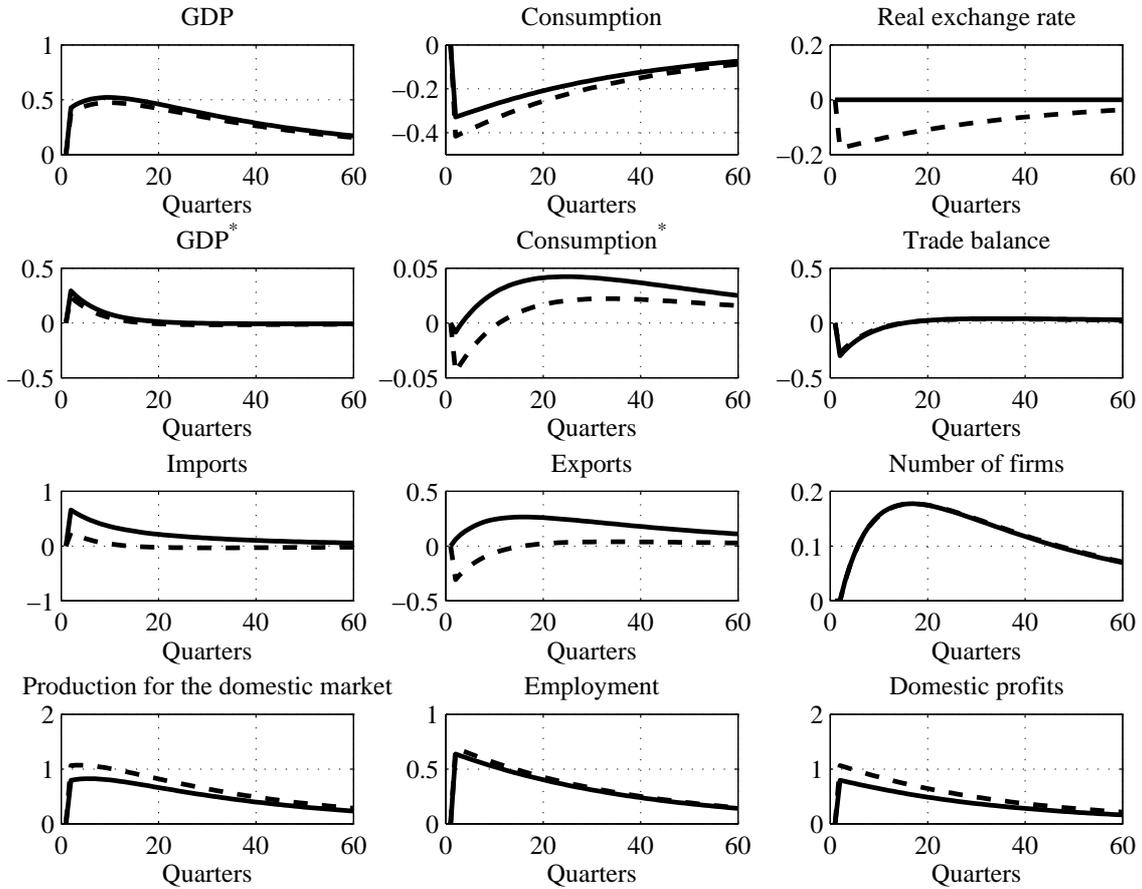


Figure 5: General government spending (solid line) versus Buy National (dashed line) under free trade

on only domestic varieties has huge adverse effects on the real exchange rate, which trigger a decrease in private demand both from home and abroad.

A comparison between figures 3 and 5 also reveals that under free trade the effects of Buy National become more harmful for the foreign country. Under free trade and under general government spending the foreign country enjoys a prolonged increase in consumption after only very few periods. Under Buy National the drop in foreign consumption in early periods is much larger, and the medium-run increases in consumption much smaller. Given that Buy National contradicts the very idea of free trade, this kind of policy is even more likely to lead to retaliation under free trade.

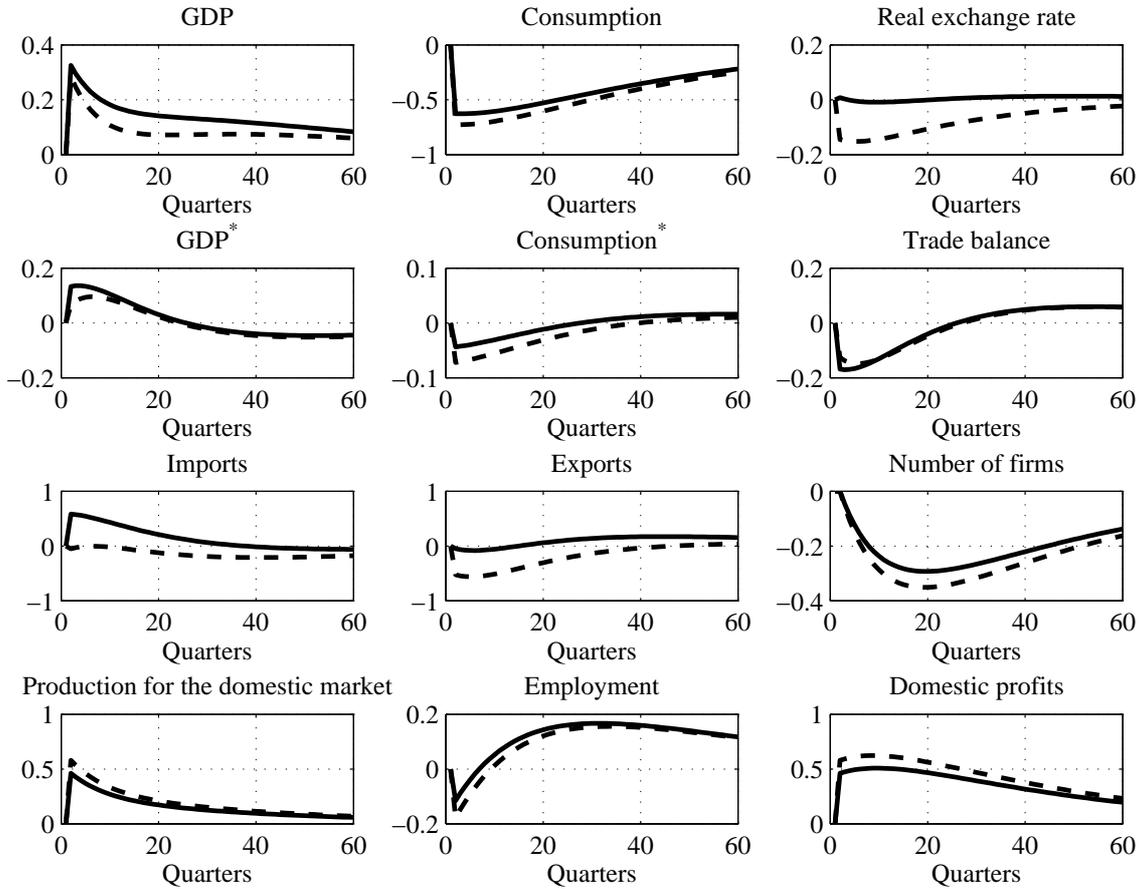


Figure 6: General government spending (solid line) versus Buy National (dashed line) with distortional taxation

5.2 Distortional Taxation

So far we have assumed that all additional expenses are financed by a lump-sum tax. While this exercise is useful in isolating the effects of the stimulus from the effects of financing the stimulus, it is of course not very realistic. Therefore, we now assume that all expenses are financed by the distortional labor tax. From this exercise one would expect the output effects of increases in government spending to be reduced, since it implies an increase in the labor tax and thereby has a negative effect on employment. This is exactly what we see in figure 6. On impact, the effect of general government spending is reduced from 0.5 to slightly above 0.3 and similarly for Buy National. The difference in the GDP effects of Buy National and general government spending becomes slightly larger. Thus, the case of distortional taxation only seems to reinforce our case.

5.3 Balanced Trade

So far we assumed bond trading at very low costs. This induced quite substantial trade deficits in the home country, off-set by corresponding trade surpluses in the foreign country. We next investigate whether the allowance of free bond trading is driving our conclusion that Buy National is not a useful business-cycle policy.

Figure 7 highlights that none of our results change qualitatively when we force balanced trade in every period. Basically, the positive GDP effects of government spending in the home country are larger, while the ones in the foreign country are smaller. This highlights that when allowing for trade imbalances, part of the stimulus spills over to the foreign country. When balanced trade is enforced, imports have to be offset by exports. With general government spending imports increase, as part of the stimulus is directly spent on foreign goods. This leads to a real exchange rate depreciation, stimulating exports. In the case of Buy National, imports and exports are hardly affected, while the real exchange rate appreciates due to the increased demand of domestic goods.

5.4 The Role of Firm Heterogeneity and Selection into Export Markets

Our model accounts for firm heterogeneity and selection into export markets because these two features have been found to be empirically important in explaining trade flows (see the recent surveys by Bernard et al., 2007, and Melitz and Redding, 2014). In this section we want to check how important these assumptions are for our qualitative results concerning the effectiveness of Buy National as a business cycle instrument. The short answer is that firm heterogeneity and selection into export markets do not matter for our qualitative judgment of Buy National clauses and that they hardly change the corresponding quantitative results.

For the simulations illustrated in figure 8 we have raised the shape parameter of the Pareto distribution from which newly entering firms draw their productivity from 3.4 to 10. This makes the Pareto distribution steeper and therefore productivity is more equally distributed. In other words, firm heterogeneity decreases.¹³ It can be seen that, qualitatively none of our results are affected. Buy National still dampens private consumption and increases GDP by less than general government spending. Quantitatively the adverse effects of Buy National are larger, but the difference is very small.

For the simulations illustrated in figure 9 we have decreased the fixed costs of exporting to close to zero, which implies that all active firms take up export-

¹³Note, however, that an increase of k also decreases the mean of the Pareto distribution.

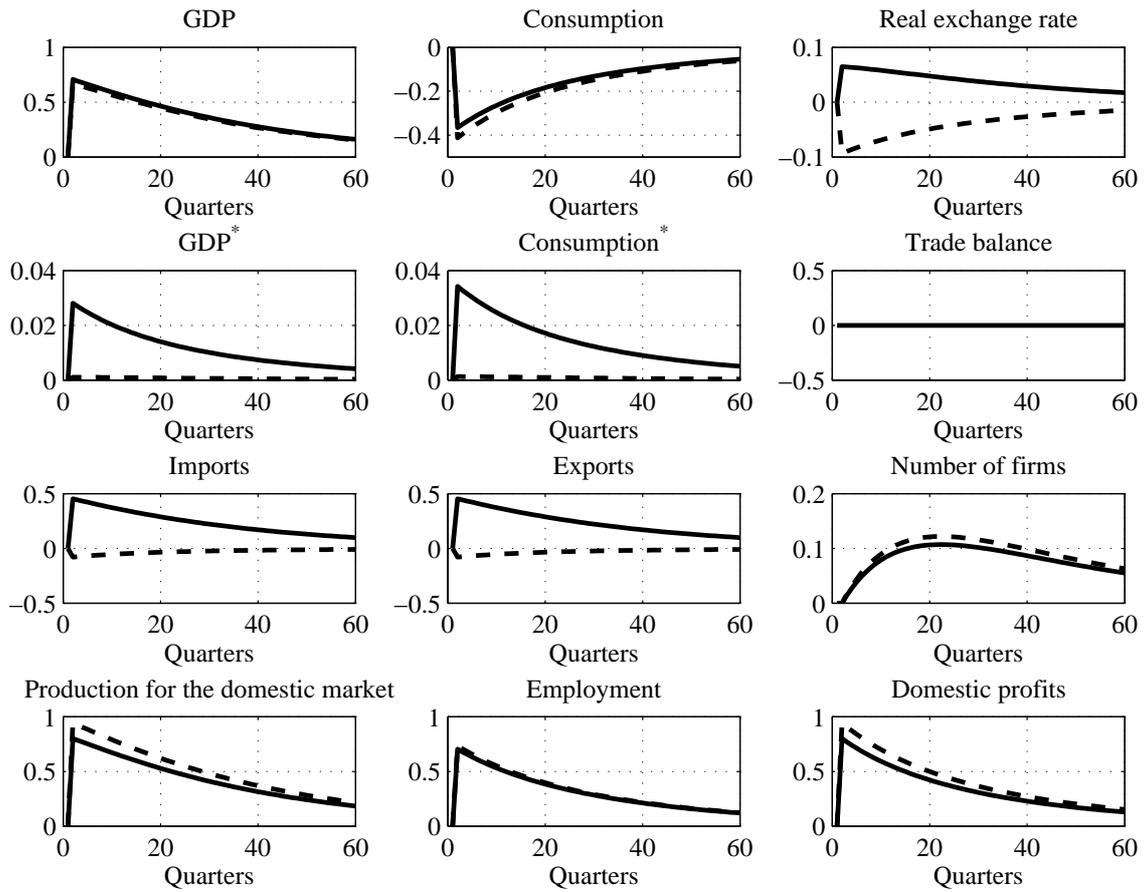


Figure 7: General government spending (solid line) versus Buy National (dashed line) with balanced trade

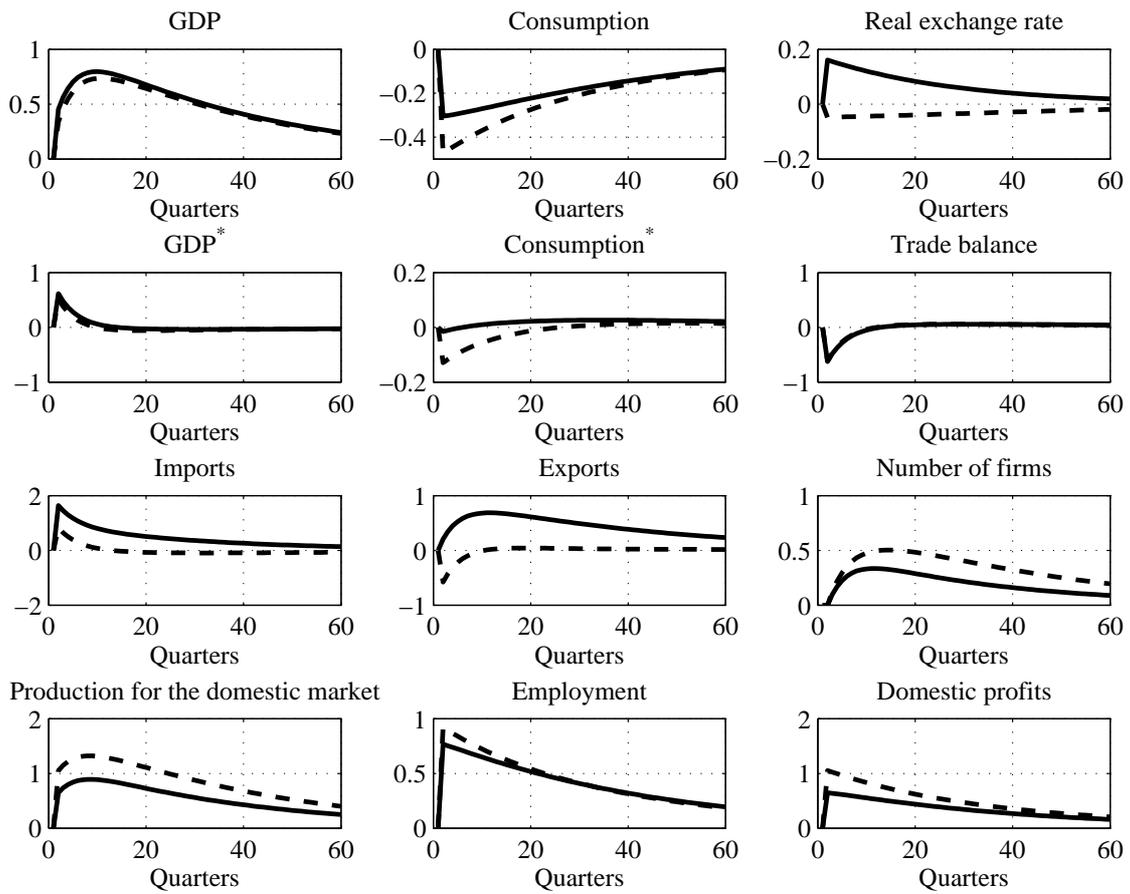


Figure 8: General government spending (solid line) versus Buy National (dashed line) with less firm heterogeneity

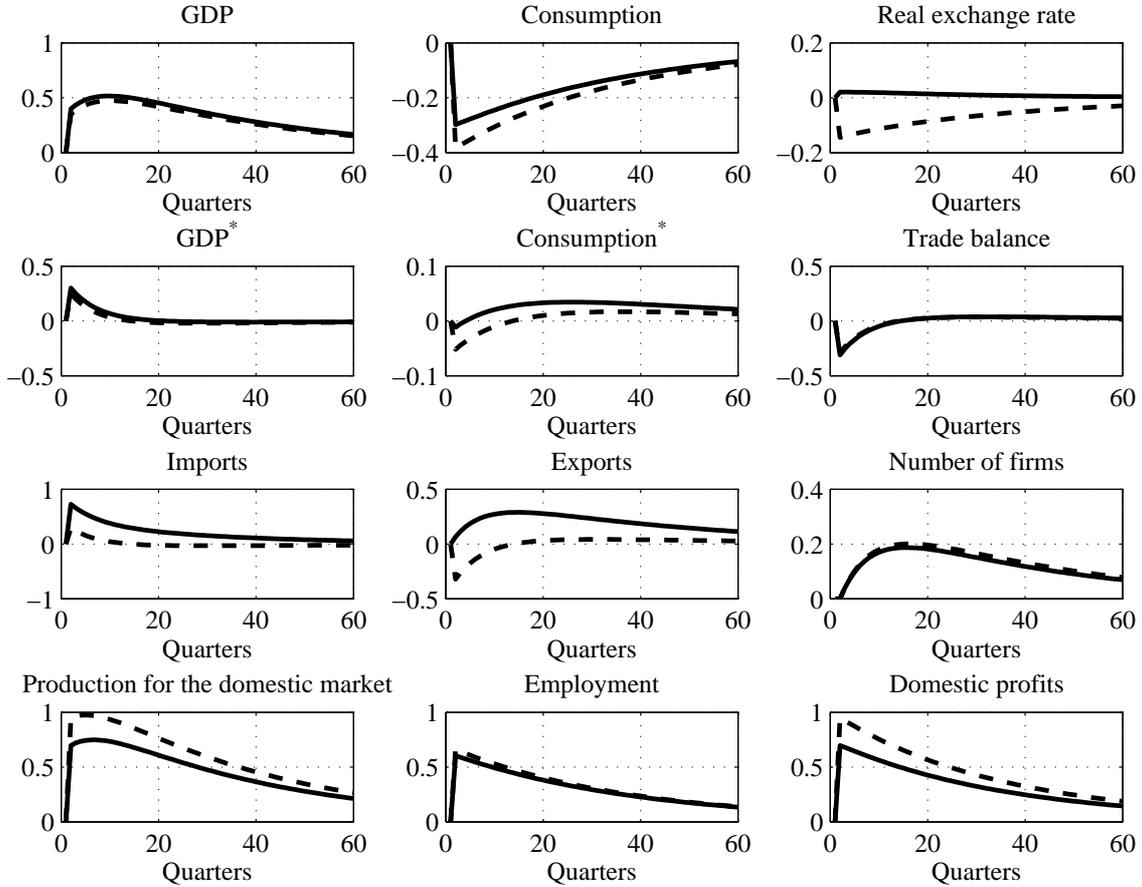


Figure 9: General government spending (solid line) versus Buy National (dashed line) without selection into export markets

ing, i.e., selection into export markets is shut off. Again results do not change qualitatively and only little quantitatively. The effects of government spending on GDP are generally smaller and the adverse effects of Buy National are a bit larger, but not by much. We can conclude that our results are robust towards the assumptions of firm heterogeneity and selection into export markets.

6 Conclusions

We have used the dynamic new-trade theory model of Ghironi and Melitz (2005) and extended it by general government spending, Buy National, endogenous labor supply and distortionary taxation to answer the question whether there is a short-run case for protectionism. The answer to this question is a clear “No.” Buy National should not be used to stimulate an economy. Although Buy National has

a positive impact on the production for the domestic market, there are also two negative effects, largely ignored in the debate so far. i) Buy National has adverse real-exchange-rate-effects, thus harming the export industry. This negative effect is about as strong as the positive effect on production for the domestic market, so that the effects on GDP are similar for both types of government spending. ii) Buy National is more expensive than general government spending. While this is irrelevant for the GDP effects, it implies that fewer products can be bought for a given amount of money. As a consequence, Buy National yields lower welfare relative to general government spending. This is a strong argument against using Buy National as a business cycle instrument.

We would like to mention one potential avenue for future research. Throughout our analysis we have assumed that prices are flexible. However, price rigidities could be relevant in this context, especially if the economy is stuck in a liquidity trap. Hence, extending our framework to account for nominal rigidities may shed further light on the effects of Buy National clauses in such situations.

References

- AUERBACH, A., AND Y. GORODNICHENKO (2012): “Measuring the Output Responses to Fiscal Policy,” *American Economic Journal: Economic Policy*, 4(2), 1–27.
- BARTELSMAN, E., AND M. DOMS (2000): “Understanding Productivity: Lessons from Longitudinal Microdata,” *Journal of Economic Literature*, 38(3), 569–594.
- BERNARD, A., J. EATON, J. JENSEN, AND S. KORTUM (2003): “Plants and Productivity in International Trade,” *American Economic Review*, 93(4), 1268–1290.
- BERNARD, A., AND J. JENSEN (1995): “Exports, Jobs, and Wages in US Manufacturing: 1976-87,” *Brookings Papers on Economic Activity: Microeconomics*, pp. 67–112.
- (1999): “Exceptional Exporter Performance: Cause, Effect, or Both?,” *Journal of International Economics*, 47(1), 1–25.
- (2004): “Why Some Firms Export,” *Review of Economics and Statistics*, 86(2), 561–569.
- BERNARD, A., J. JENSEN, S. REDDING, AND P. SCHOTT (2007): “Firms in International Trade,” *Journal of Economic Perspectives*, 21(3), 105–130.
- (2009): “The Margins of US Trade,” *American Economic Review Papers and Proceedings*, 99(2), 487–493.
- CHANEY, T. (2008): “Distorted Gravity: The Intensive and Extensive Margins of International Trade,” *American Economic Review*, 98(4), 1707–1721.
- CHRISTIANO, L., M. EICHENBAUM, AND S. REBELO (2011): “When is the Government Spending Multiplier Large?,” *Journal of Political Economy*, 119(1), 78–121.
- CLERIDES, S., S. LACH, AND J. TYBOUT (1998): “Is Learning by Exporting Important? Micro-Dynamic Evidence from Columbia, Mexico, and Morocco,” *Quarterly Journal of Economics*, 113(3), 903–947.
- COENEN, G., C. ERCEG, C. FREEDMAN, D. FURCERI, M. KUMHOF, R. LALONDE, D. LAXTON, J. LINDE, A. MOURougANE, D. MUIR, S. MURSULA, C. DE RESENDE, J. ROBERTS, W. ROEGER, S. SNUDDEN, M. TRABANDT, AND J. IN’T VELD (2012): “Effects of Fiscal Stimulus in Structural Models,” *American Economic Journal: Macroeconomics*, 4(1), 22–68.

- COGAN, J., T. CWIK, J. B. TAYLOR, AND V. WIELAND (2010): “New Keynesian versus Old Keynesian Government Spending Multipliers,” *Journal of Economic Dynamics and Control*, 34(3), 281–295.
- DAVIS, S., AND J. HALTIWANGER (1992): “Gross Job Creation, Gross Job Destruction, and Employment Reallocation,” *Quarterly Journal of Economics*, 107(3), 819–863.
- DEVEREUX, M., A. HEAD, AND B. LAPHAM (1996): “Aggregate Fluctuations with Increasing Returns to Specialization and Scale,” *Journal of Economic Dynamics and Control*, 20(4), 627–656.
- DUNNE, T., M. ROBERTS, AND L. SAMUELSON (1989): “The Growth and Failure of U.S. Manufacturing Plants,” *Quarterly Journal of Economics*, 104(4), 671–698.
- EUROPEAN COMMISSION (2011): *Final Report - Cross-Border Procurement Above EU Thresholds*. available at http://ec.europa.eu/internal_market/publicprocurement/docs/modernising_rules/cross-border-procurement_en.pdf.
- EVENETT, S. (2010): *Tensions Contained... For Now: The 8th GTA Report*. CEPR, London.
- FAHRI, E., G. GOPINATH, AND O. ITSKHOKI (2014): “Fiscal Devaluations,” *Review of Economic Studies*, 81(2), 725–760.
- GALÍ, J., J. D. LÓPEZ-SALIDO, AND J. VALLÉS (2007): “Understanding the Effects of Government Spending on Consumption,” *Journal of the European Economic Association*, 5(1), 227–270.
- GALI, J. (2008): *Monetary Policy, Inflation, and the Business Cycle*. Princeton University Press, Princeton, New Jersey.
- GHIRONI, F. (2006): “Macroeconomic Interdependence under Incomplete Markets,” *Journal of International Economics*, 70(2), 428–450.
- GHIRONI, F., AND M. MELITZ (2005): “International Trade and Macroeconomic Dynamics with Heterogeneous Firms,” *Quarterly Journal of Economics*, 120(3), 865–915.
- (2007): “Trade Flow Dynamics with Heterogeneous Firms,” *American Economic Review Papers and Proceedings*, 97(2), 356–361.
- HELPMAN, E., M. MELITZ, AND Y. RUBINSTEIN (2008): “Trading Partners and Trading Volumes,” *Quarterly Journal of Economics*, 123(2), 441–487.

- LARCH, M., AND W. LECHTHALER (2011): “Why “Buy American” is a Bad Idea but Politicians Still Like It,” *Canadian Journal of Economics*, 44(3), 838–858.
- (2013): “Buy National or Buy International? The Optimal Design of Government Spending in an Open Economy,” *International Review of Economics and Finance*, 26, 87–108.
- LEWIS, V. (2009): “Business Cycle Evidence on Firm Entry,” *Macroeconomic Dynamics*, 13(5), 605–624.
- LINNEMANN, L., AND A. SCHABERT (2012): “Optimal Government Spending with Labor Market Frictions,” *Journal of Economic Dynamics and Control*, 36(5), 795–811.
- MELITZ, M. (2003): “The Impact of Trade on Intra-Industry Reallocations and Aggregate Industry Productivity,” *Econometrica*, 71(6), 1695–1725.
- MELITZ, M., AND S. REDDING (2014): “Heterogeneous Firms and Trade,” Chapter 1 in the *Handbook of International Economics Vol. 4*, eds. Gopinath, Helpman, and Rogoff, Elsevier Ltd., Oxford.
- MONACELLI, T., AND R. PEROTTI (2010): “Fiscal Policy, the Real Exchange Rate and Traded Goods,” *The Economic Journal*, 120(544), 437–461.
- OBSTFELD, M., AND K. ROGOFF (2001): *The Six Major Puzzles in International Macroeconomics: Is There a Common Cause?* in: Bernanke, B.S., and K.S. Rogoff (eds.), *NBER Macroeconomics Annual 2000*, Cambridge, MA: MIT Press.
- ROBERTS, M., AND J. TYBOUT (1997): “The Decision to Export in Colombia: An Empirical Model of Entry with Sunk Costs,” *American Economic Review*, 87(4), 545–564.
- TRABANDT, M., AND H. UHLIG (2011): “The Laffer Curve Revisited,” *Journal of Monetary Economics*, 58(4), 305–327.
- UHLIG, H. (2010): “Some Fiscal Calculus,” *American Economic Review*, 100(2), 30–34.