



Contents lists available at ScienceDirect

Journal of International Economics

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ARTICLE INFO

Article history:

Received 5 March 2014

Received in revised form 22 March 2015

Accepted 30 March 2015

Available online xxx

JEL classification:

F12

F16

F23

Keywords:

Offshoring

Heterogeneous firms

Income inequality

ABSTRACT

We develop a two-country general equilibrium model, in which heterogeneous firms offshore routine tasks to a low-wage host country. In the presence of fixed costs for offshoring the most productive firms self-select into offshoring, which leads to a reallocation of domestic labor towards less productive uses if offshoring costs are high. As a consequence domestic welfare may fall. The reallocation effect is reversed and domestic welfare rises if offshoring costs are low. The aggregate income distribution, comprising wages and entrepreneurial incomes, becomes more unequal with offshoring.

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1. Introduction

Fragmentation of production processes across country borders, leading to the offshoring of tasks that used to be performed domestically, is widely seen as a new paradigm in international trade. Public opinion in high-income countries has been very critical of this phenomenon, and much more so than of traditional forms of international trade, since it seems obvious that offshoring to low-wage countries destroys domestic jobs.¹ Academic research has drawn a picture of the effects of offshoring

that invites a more nuanced view of the phenomenon than the one held by the general public. The academic literature points out that the effect of offshoring on workers in the source country is ambiguous *ex ante*: On the one hand, offshoring has indeed the obvious *international relocation effect* emphasized in the public discussion, as tasks that were previously performed domestically are now performed offshore, thereby harming domestic workers. On the other hand, however, there is a *productivity effect*, as the ability to source tasks from a low-wage location abroad lowers firms' marginal cost, thereby increasing overall domestic income, which benefits domestic workers, *ceteris paribus*.

We show in this paper that important additional insights into the effects of offshoring can be gained by adding firm differences to the picture, thereby acknowledging the empirical regularity that offshoring is highly concentrated among large firms, with many smaller firms doing no offshoring at all (cf. Paul and Yasar, 2009; Monarch et al., 2013; Hummels et al., 2014; Moser et al., 2015).² In particular we show that offshoring, unlike international trade in final goods, may cause a reallocation of production workers from high- to low-productivity firms, and may also lead to firm entry at the lower end of the economy's productivity distribution. The offshoring-induced reallocation of employment shares is at the heart of our paper, and we show that this effect can be important for aggregate welfare in the source country of offshoring. The mechanism leading to the reallocation of employment from high- to low-productivity firms is straightforward:

[☆] We would like to thank two anonymous reviewers for their useful comments and suggestions. We are grateful to Eric Bond, Jonathan Eaton, Gabriel Felbermayr, Gino Gancia, Gene Grossman, James Harrigan, Samuel Kortum, Marc Muendler, Priya Ranjan, Jens Südekum, Ian Wooton, to seminar audiences at the University of Duisburg–Essen, the National University of Ireland, Sciences Po, the Vienna University of Economics and Business, the University of Würzburg, and HSE St. Petersburg, and to participants at the European Economic Association Annual Congress, the German Economic Association Annual Conference, the CESifo Global Economy Conference, the European Trade Study Group Annual Conference, the Midwest International Trade Meetings, the Sinergia Workshop on “Economic Inequality and International Trade” in Hurden, the Tübingen Conference on “Offshoring and International Production”, and the Göttingen Workshop on International Economics for encouraging discussion.

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¹ As pointed out by The Economist (2009), “Americans became almost hysterical” about the job destruction due to offshoring, when Forrester Research predicted a decade ago that 3.3 million American jobs will be offshored by 2015. Using survey data from Germany, Geishecker et al. (2012) find that offshoring to low-wage countries explains about 28% of the increase in subjective job loss fears over the period from 1995 to 2007.

² We give an in-depth overview over the evidence relevant to our modeling approach in Section 2 below.

Falling trade costs, starting from their prohibitive level, lead to offshoring among the most efficient firms, which frees some domestic labor and lowers domestic wages. As a consequence, the least productive firms hire more domestic labor and thus expand.

To conduct our analysis, we set up a general equilibrium model that features monopolistic competition among heterogeneous firms. In many aspects, the model resembles Lucas (1978): each firm needs to be run by an entrepreneur and agents are identical in their productivity as workers, but they differ in their entrepreneurial abilities. These abilities are instrumental for firm productivity and thus for the profit income the entrepreneur earns when becoming the owner-manager of a firm. Agents are free to choose among occupations, and individual ability determines who becomes an entrepreneur and who becomes a worker.³ We extend the Lucas (1978) model to a two-country setting, and we assume that entrepreneurs exist in only one of them. This country ends up as the source country of offshoring, while the other country is the host country.

Similar to Grossman and Rossi-Hansberg (2008) and Acemoglu and Autor (2011) we model output of a firm as a composite of different tasks, and furthermore assume that only some of the tasks performed by a firm are offshorable. According to the taxonomy in Becker et al. (2013), these are tasks that are routine (cf. Levy and Murnane, 2004) and do not require face-to-face contact (cf. Blinder, 2006). Offshoring allows firms to hire foreign workers to perform routine tasks at a lower wage, and this provides an incentive for firms based in the source country to shift production of these tasks abroad. This incentive is not unmitigated, since firms relocating their routine tasks abroad have to pay a fixed offshoring cost, and shipping back to the source country the intermediate inputs produced in the host country is subject to iceberg trade costs.

As we model the production process in a similar way to Grossman and Rossi-Hansberg (2008), our model shares important features of their work. In particular, offshoring in our model and in theirs features both the international relocation effect (which Grossman and Rossi-Hansberg call “labor supply effect”) and the productivity effect.⁴ Since the goods market in the framework of Grossman and Rossi-Hansberg (2008) is perfectly competitive and firms are atomistic, both effects are identified in their model only in terms of their aggregate implications – the first one harming domestic workers by reducing their wage, the second one benefiting them by increasing their wage. In contrast, our framework with monopolistic competition features firms of well-defined size, and we can therefore identify the international relocation effect and the productivity effect at the firm level (with the first one leading to a reduction in domestic employment of an offshoring firm, and the second one leading to an increase), thereby allowing a direct mapping to the empirical literature using firm level data (Hummels et al., 2014).

With firm heterogeneity, the firm-level effects themselves as well as their implication for the economy-wide labor allocation depend on the composition of the firm population, i.e. the relative number of offshoring and purely domestic firms (itself an endogenous variable). If variable offshoring costs are high, only the high-productivity firms benefit from shifting production of their routine tasks abroad. In this case, the firm-level productivity effect is negligible, since marginal cost savings are small due to high obstacles to international production

shifting, while the international relocation effect is sizable, since all offshoring firms relocate a discrete fraction of their tasks, and therefore the firm-level employment effect in newly offshoring firms is unambiguously negative. As a consequence, offshoring unambiguously reallocates domestic labor into less productive uses. Domestic jobs in highly productive firms disappear, and workers losing their jobs in these firms either choose to start their own firm despite being of comparatively low productivity, or they work for a (new or old) purely domestic firm. When variable offshoring costs are low, the effects are reversed: the firm-level employment effect in newly offshoring firms turns positive, and offshoring reallocates labor towards more productive firms. The potentially unfavorable effect on the resource allocation in the source country constitutes a fundamental difference between offshoring and international goods trade, where standard models with firm heterogeneity (cf. Melitz, 2003) feature an unambiguous reallocation of labor towards more productive firms; and the resulting increase in average industry productivity has been one of the important novel insights from this strand of literature (cf. Melitz and Trefler, 2012).

Having established our main result, we show that the offshoring-induced reallocation of employment shares across firms of different productivity is directly welfare relevant. Provided that the autarky equilibrium is distorted the offshoring-induced reallocation of employment towards less productive firms may cause a drop in domestic welfare. This finding complements a rich literature that so far mainly has focused on negative welfare effects of offshoring that result from an offshoring-driven deterioration of the terms of trade in multi-sector models (cf. Samuelson, 2004; Bhagwati et al., 2004; Mankiw and Swagel, 2006; Grossman and Rossi-Hansberg, 2008; Rodriguez-Clare, 2010). Markusen (2013) and Baldwin and Robert-Nicoud (2014) provide a systematic analysis of this issue. Associating offshoring with an expansion of trade along the extensive margin, they show that domestic gains from offshoring are guaranteed if a country's terms of trade do not deteriorate and that the source as well as the host country of offshoring gain if relative world prices of initially-traded goods do not change. However, as pointed out by Markusen (2013) these results do not extend in a straightforward way to models with imperfect competition and external scale economies, and our model with only a single final good, in which welfare losses for the source country are a result of an unfavorable domestic reallocation effect, is a case in point.

Irrespective of the sign of the reallocation effect, offshoring in our model always leads to higher income inequality between workers and entrepreneurs, and also to a more unequal income distribution within the group of entrepreneurs. We show that as a consequence aggregate income inequality, as measured by the Lorenz criterion, is higher in any equilibrium with offshoring than in autarky.

Our paper is related to the large literature that studies offshoring to low-wage countries, including the key contributions by Jones and Kierzkowski (1990), Feenstra and Hanson (1996), Kohler (2004), Rodriguez-Clare (2010), and, as earlier discussed in detail, Grossman and Rossi-Hansberg (2008).⁵ Only a few papers in the literature on offshoring consider firm heterogeneity. Antràs and Helpman (2004) were the first to analyze a firm's sourcing decision in the presence of firm heterogeneity. In their model, which features incomplete contracts, they explain the coexistence of up to four different sourcing modes (outsourcing vs. in-house production in the domestic or foreign economy, respectively) as well as the prevalence of certain sourcing patterns when firms with different productivities self-select into these modes. Importantly, Antràs and Helpman (2004) address neither the welfare nor the distributional effects of offshoring, which are the focus of our

³ Support for the occupational choice mechanism between entrepreneurship and employment as formalized in Lucas (1978) comes from matched worker-firm-owner data, which show that individuals who are unemployed (cf. Berglann et al., 2011) or displaced from their job (cf. von Greiff, 2009) are more likely to select into entrepreneurship. More indirect evidence on this mechanism comes from Germany, where active labor market policies (ALMP) subsidizing start-ups for unemployed (unlike other ALMP) turned out to be quite successful (cf. Caliendo and Künn, 2011).

⁴ Grossman and Rossi-Hansberg (2008) identify a third effect of offshoring, which materializes if the relative prices of export and import goods change in the process of offshoring. This terms of trade effect is absent in our model with a single final good and production of this good in just one country.

⁵ In very recent work, Acemoglu et al. (forthcoming) consider a Ricardian model in which offshoring induces directed technical change. With technical change favoring high-skilled workers at low levels of offshoring, this model provides a rationale for the empirical observation of rising skill premia in developed as well as developing countries. Costinot et al. (2013) use a Ricardian framework with many goods and countries to study vertical specialization of countries along the global supply chain.

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