Responses to Reviewer #1 on International Trade and Polarization in the Labor Market DP2011-48-2

I'm thankful the referee for her/his comments. Here are my responses to the three concerns raised.

1. The first regards the modelling framework, in particular the preferences of the agents. The author starts by specifying indirect utility as $\pi(p)(w_j-C_E)$ (page 8), only to switch to equation (2) two pages later. The difference between the two is visible in figures 3 and 4. Whereas the former formulation is standard and has been used in this context before, the second formulation — which the author subsequently adopts — is non-standard. And I fail to see the benefit of introducing income as a signal in a trade context. Do the results presented in the paper depend on this particular feature of the model? If the answer is positive, it casts doubt on the robustness of the results; if it is negative, then why make this rather unusual assumption.

Yes, I knew and agree that my assumption of income valuation in the utility function is non-standard. Any assumption amounts to some abstraction from reality. As I have stated on page 9 (bottom paragraph) of the paper, this nonstandard assumption helps me to abstract from *intra*-skill wage differential, i.e., wage differential among low-skill workers, that among middle-skill workers and that among high-skill workers. It does *not* abstract from inter-skill wage differential, i.e., wage differential between low, medium and high skill labor – which is the focus of the paper.

Furthermore, as I have stated clearly on top of page 10 of the paper, **all results** in the paper on employment composition, that is, polarization go through without this interpretation. The *only* reason I did not opt for the standard specification, is that under this specification the ratio of wages per effective unit of labor, e.g., w_M/w_O or w_H/w_M , would not represent average wage premia. In order to calculate wage premia one would have to evaluate the whole integral; it is not possible to analytically solve what happens to wage premia as a consequence of a trade shock. One would have to use simulations.

To sum up, since my focus is on *inter*-category wage differential, not *intra*-category wage differential, an assumption, which effectively washes away intra-category differentials, seems to me as appropriate (regardless of whether it is standard or not). It buys analytical simplicity, while preserving the focus on skill composition and inter-category wage differential.

2. My second concern is the various changes in setup made throughout the paper. At first the author assumes three factors, namely three different skill-levels of labor.

Then he assumes prefect (not quite perfect, in fact) substitutability between the low and medium type which raises the question why we don't call this the same factor. Subsequently we add another factor, land, make factors specific, add a credit markets, and render it imperfect again. The reader is left wondering which one is relevant exactly when. As readers, we certainly do not expect the author to deliver the one-and-only true model, but we would like to know under which circumstances which of the different sets of assumptions are most relevant.

- (i) The two perfectly substitutable factors are indeed lumped into one (as a composite) in the model from their demand side. But perfect substitutability does not imply equal (marginal) productivity. Medium-skill labor is assumed to have has higher productivity and thus command higher wages. Accordingly, from the supply side, the choice between the two types of skill is *not* a degenerate problem. Because the supply of two perfectly substitutable inputs can vary individually, they have to be treated separately if the aim is to predict equilibrium labor composition.
- (ii) The purpose behind using different models is to show the different channels through which trade shocks may lead to polarization. However, the summary provided by the reviewer does not comment on or discuss these. Hence, I outline them below for the benefit of readers.¹

International Trade

The question posed is how an increase in the relative price of high-skill labor intensive good may contribute to polarization in employment.

The paper's analysis begins with a variation of the standard two-sector, two-factor model, which assumes that medium and low skill labor are perfect substitutes of each other. As the relative price of the high-skill-labor intensive product rises, high-skill wage rises, and both middle- and low-skill wages fall in the same proportion. The ratio of high-skill to medium-skill wage increases. Assuming that high-skill education is imparted by high-skill workers and the cost of high-skill education is proportional to high-skill wage, the excess return on high-skill education over medium skill increases with the ratio of high-skill to medium-skill wage. As the latter increases, so does the excess return on high-skill education. There is a movement away from medium-skill education to high-skill education. The employment share of high-skill labor increases.

The return on middle-skill education depends on middle- and low-skill wages, and, the cost of acquiring middle-skill education. As long as middle-skill and low-skill labor are perfect substitutes (more generally highly substitutable) in production, there will be little change in the relative wage between the two, implying that the absolute difference between the two wage rates will shrink as the rela-

¹The same appears in my response to Referee #2.

tive price of the high-skill labor intensive good rises. If medium-skill education is imparted by high-skill labor also (while one unit of high-skill labor can teach/train more individuals seeking medium skill than those seeking high skill) and the cost of medium-skill education rises with high-skill wage, there will be an unambiguous decline the return from medium-skill education compared to no education. It will imply a movement away from medium skill to low-skill jobs. The employment share of low-skill labor increases too. Medium-skill jobs are squeezed from both sides.

It is shown next that as long as medium- and low-skill labor are highly substitutable, the polarization holds even in a sector-specific framework, not just in a 2×2 framework.

The next general point is that high substitutability between medium- and low-skill labor is not critical. An increase in the relative price of high-skill labor intensive exports would lead to polarization if the non-traded sector produces services that are highly unskilled-labor intensive.

In sum, two factors behind how an increase in the relative price of high-skill labor intensive exports may contribute to polarization are uncovered:

- (a) high-substitutability of between medium- and low-skill labor and
- (b) the non-traded sector producing highly unskilled labor services.

Off-Shoring

While the results are similar to Grossman/Rossi-Hansberg, this is true only in spirit - especially to their "productivity effect." There are substantial differences and generalizations however.

- (a) Grossman and Rossi-Hansberg did not analyze the effect of off-shoring on employment composition or polarization, which is the focus of this paper. Assuming fixed labor supplies they considered how off-shoring would affect wages. Accordingly I have a new effect, which I have called a **variable labor supply effect**, quite different from the excess labor supply implied by the productivity effect.
- (b) In this paper I have looked at wages *and* employment variation of *three* grades of labor, whereas they considered wages for two types of labor only and that too assuming fixed labor supplies.

Results/Predictions Relative to the Existing Literature

With regard to off-shoring I have already stated the comparative results.

Furthermore, as stated on page 5 of the paper, a main result of Blanchard and Willmann, a related paper, is that a decline in the middle-range jobs (polarization) is a result of a decrease in trade costs of middle-skill range sectors.

The prediction of this paper is sharply different: namely, polarization results from an increase in the relative price of the most skill intensive traded sector.

- 3. The third point, finally, regards the value added of the paper. Three types of labor is much less than infinitely many, like in a continuum setup used by Costinot/Vogel or Blanchard/Willman. Autor has presented a three factor model in at least one of his papers. This raises the question what the paper adds beyond what has already been presented in those papers, especially since the simplification to three types of labor may cloud the view of the role played by the convexity of the wage structure.
 - (i) Of course, "Three types of labor is much less than infinitely many." Having a continuum of skill (infinitely many skills) is an elegant theoretical construct capable of generating many new insights. But, surely, it cannot claim to offer all important insights particularly those stemming from various *asymmetries* across sectors (which are conveniently captured in a three-factor model).
 - (ii) I admit I am a bit puzzled by the statement that a question should be raised about the value-added of my paper, *because* a well-known, three-factor analysis (Autor's) already exists. As said in the Introduction, Autor uses it to advance an SBTP rationale of employment polarization. In this paper I use a *different* three-variable-factor model along with *many sectors* (as opposed to one used by Autor), and try to advance a *different* hypothesis. The economic scenario analyzed in the paper is vastly different from Autor's although the common aim is to understand/explain polarization in the labor market.
 - (iii) Finally, wage as a function θ is not convex even in Figure 3. Am I missing something?

Overall

In the process of responding to the referee's concerns, I have outlined the mechanisms or channels through which an increase in the relative price of high-skill labor products may contribute towards polarization in employment composition. I have also stated how the main prediction of the paper sharply differs from the existing literature and in what respects the paper's analysis of off-shoring generalizes Grossman and Rossi-Hansberg's work.

It is up to the editors, referees and readers to judge whether the paper's material is interesting or useful enough.