The Robot Revolution and Tax Policy

After decades of key component improvements, robots are mainstreaming into the American economy. Key robot components that have greatly improved in recent years include:

1. Vision systems (eyes)
2. Gripping devices and end of arm effectors (hands and arms)
3. Movement including rollers (legs and feet)
4. Longer battery life that greatly enhances mobility

Moreover, the robots that are mainstreaming are much simpler, enabling easier and shorter implementation times. High volume robot sales are now occurring in multiple vertical markets including consumer goods, manufacturing, warehouse, medical, and agricultural markets.

The substitution of human workers by robots has multiple tax impacts. Human employment reduction will reduce payroll taxes, unemployment taxes and all employee related benefit costs. A robot can work 24/7, excluding time allocated for repairs and maintenance, and doesn't need time off. Multi-state corporations that utilize robots at a particular location will pay less state income taxes in that jurisdiction compared to other locations that do not utilize robots to the same extent. For example, a company with multiple warehouses that converts one warehouse to Kiva inventory picking machines may pay less corporate taxes to that jurisdiction.

This result occurs because state corporate income allocation will usually include a payroll allocation and reduced payroll in a jurisdiction means a lower corporate income allocation to that jurisdiction. On the other hand, robot purchases may be subject to state personal property taxes and possibly sales tax as well, depending on the intended use. State manufacturing exemptions may or may not be available for the purchase of robots used for packaging.

The chart below illustrates some of the growing high volume robot markets and brands.

Sample High Volume Robot Brands

Consumer	Roomba vacuum cleaners	Manufactured by iRobot. iRobot has sold over 10 million robots worldwide which includes vacuum cleaners, floor scrubbers, pool cleaners, etc.
Manufacturing	Baxter self-programmable robots	Designed and manufactured in the U.S. by Rethink Robotics, Baxter can learn as it works and is able to work in environments close to human workers. Baxter robots are being provided on a complimentary basis to many leading universities.
Warehouses	Kiva automated material handling	Kiva Systems, a wholly owned subsidiary of Amazon.com, consists of several components that work together to allow inventory and components to be moved to any operator at any time.

	systems	
Medical	da Vinci surgical robots	Over the past decade, over 1.5 million surgeries have been performed worldwide using the da Vinci Surgical System. This robot is somewhat different than the others in that it is 100% controlled by a human but can be more precise than a human, thus allowing for a less invasive surgical process compared to traditional surgery.
Agricultural	Harvest Automation agricultural robots	Designed to perform material handling tasks in unstructured environments such as greenhouses and nurseries. Research continues in this rapidly developing field.

To date robots have not had a major impact on tax policy, however with increasing implementation of robots that process increasingly higher volumes of tasks, robots will impact tax policy in the near future.